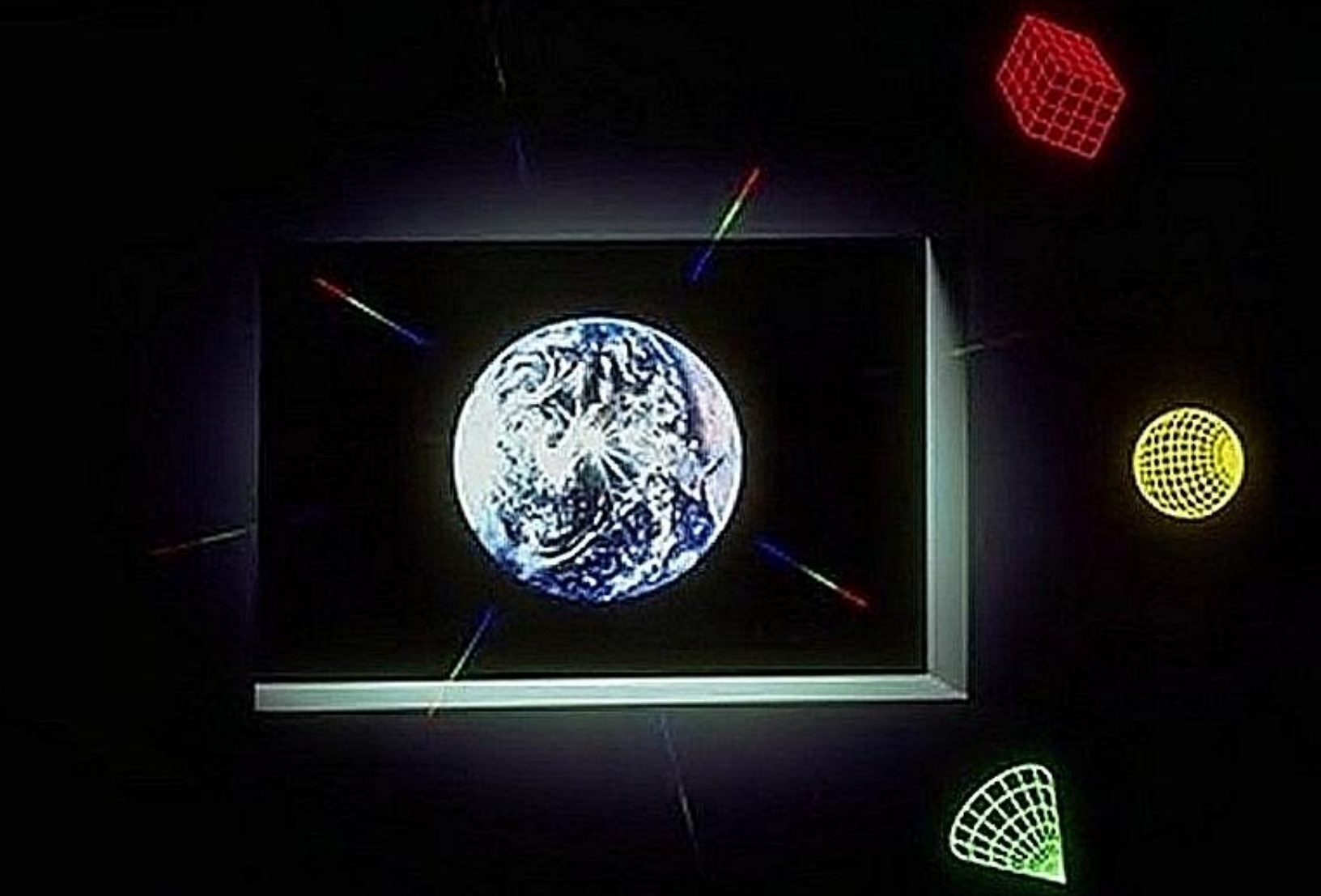
National Aeronautics and Space Administration

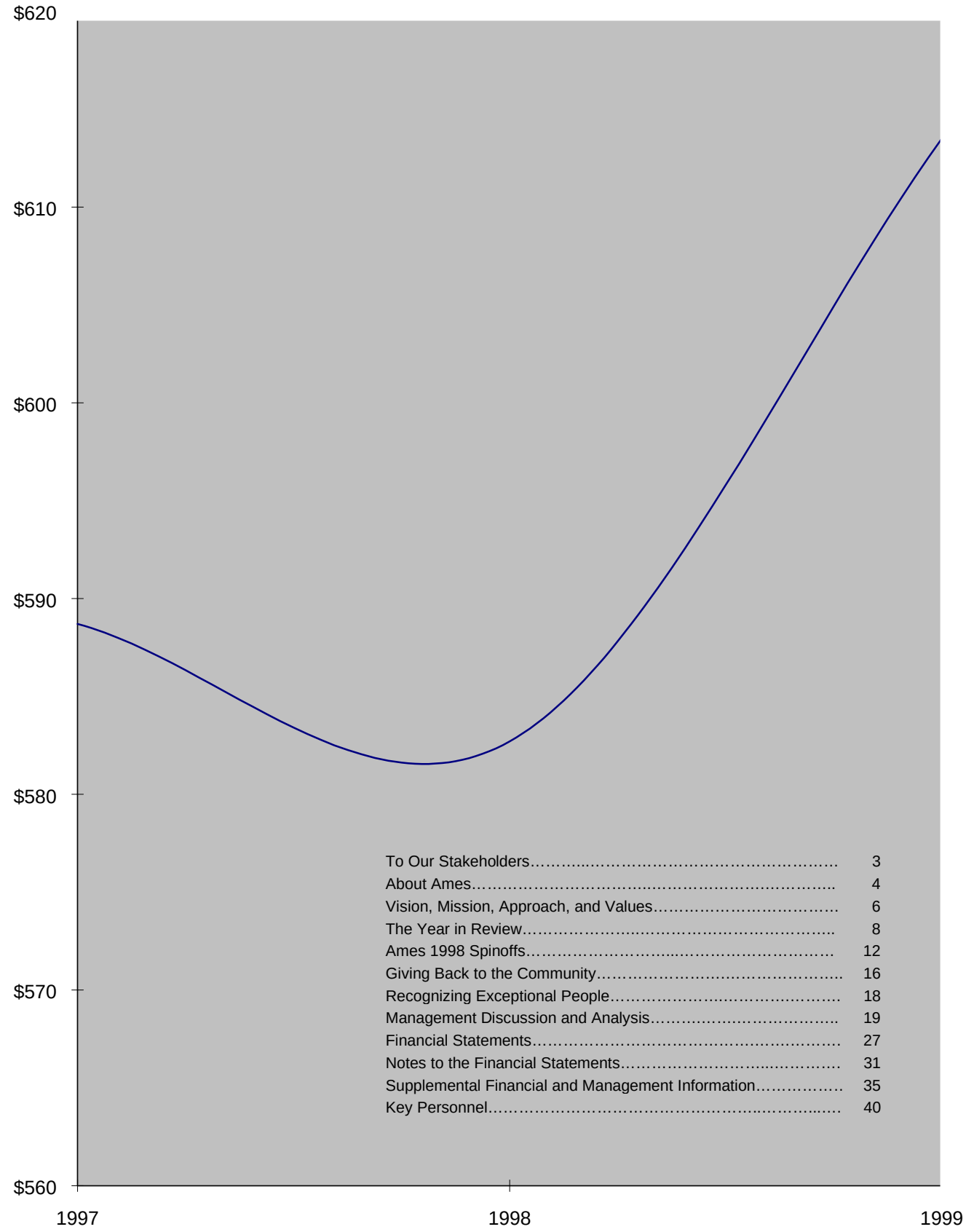
Ames Research Center

Annual Report



1998

Prepared by the Office of the Chief Financial Officer



Budget Trend (in millions)

TO OUR STAKEHOLDERS

These are exciting times at Ames Research Center. In the last 12 months, the work performed by Ames personnel has expanded our understanding of the universe, made civil aviation cheaper and safer, and advanced the state of the art of information technology. We are proud of all that we have accomplished and envision similar feats in the future. From a managerial perspective, we are also proud of how the Center has aligned its work with the goals and objectives established for NASA and its Enterprises. By delivering on our promises, we've ensured that the Nation is getting a return on its investment in NASA.

We are pleased to present the 1998 Annual Report of Ames Research Center. This report highlights our activities and accomplishments for the year. Once again, the people of Ames demonstrated their exceptional talent, commitment to excellence, and unrivaled dedication. The report covers the Center's activities from October 1, 1997 through September 30, 1998.

Henry McDonald
Director

Lewis S. G. Braxton III
Chief Financial Officer

"The Center of Excellence for Information Technology"

The strength of American aeronautics owes a great deal of gratitude to the Ames Research Center, situated in Mountain View, California. It was founded in 1939 as an aircraft research laboratory by the National Advisory Committee for Aeronautics (NACA), the committee from which NASA was created. The center is home to three national wind tunnels, including the largest in the world. Ames research in aeronautics is ongoing in fixed-wing and rotorcraft, air traffic control technology, artificial intelligence, and human factors.

Convex 3800 mass storage computer

Ames is NASA's Center of Excellence for information technology (IT). Advanced IT is the vital key to providing revolutionary solutions to the challenges posed by the increasing complexity of NASA's aeronautics and space missions.

Ames' IT effort uses advanced computing systems to analyze data, transforming it into knowledge that can be displayed in visual, virtual, and multimedia environments to aid in the scientific decision-making process. IT systems "learn" as they go, developing the capability to make decisions on the basis of "experience" using limited data inputs. Take, for instance, landing a damaged aircraft safely. Information technologies can draw from a knowledge base and make automatic adjustments to the plane, assuring a safe runway touchdown. Aviation operations can also be augmented through IT, providing air traffic controllers, airlines, and pilots with up-to-the-minute information about weather and aircraft position, and will select the best route to a given destination.

12 Foot Pressure Wind Tunnel fan powered by a 15,000 horsepower motor

Advances in IT will mean intelligent spacecraft can explore planets, comets, and asteroids, working in teams without human intervention. Ames IT specialists envision special software and tiny on-board computers enabling planetary probes to be so small and intelligent that several can be sent on each exploratory mission.

In October 1991, the United States Congress passed Public Law 102-139 establishing the NASA Software Independent Verification and Validation (IV&V) Facility to ensure that cost effectiveness and safety continue to be top priorities in current and future NASA programs. Consolidating software IV&V activities into a single organization enhances the commitment to reducing costs while providing an independent analyses of mission software to improve safety. As of October 1, 1995, the Software IV&V Facility became a part of the Center of Excellence for Information Technology (COE-IT) at Ames Research Center.

"Our vision in NASA is to open the space frontier. When people think of space, they think of rocket plumes and the Space Shuttle, but the future of space is in information technology. We must develop a virtual presence in space, on planets, in aircraft, and spacecraft," explains NASA Administrator, Daniel Goldin.

Research in aerospace safety at Ames was highlighted in 1997 by creation of a computer generated "virtual" laboratory. The laboratory permits researchers located anywhere in the world to study potentially dangerous aircraft and spacecraft situations without risking human life. In the past, pilots, aerospace engineers, and scientists who were directly involved in tests had to be physically present in a building that houses the world's largest flight simulator.

Ames' simulator is able to move airplane and spaceship cockpits in all directions, including 60 feet vertically and 40 feet horizontally. Five interchangeable cockpits are used to simulate the Space Shuttle, helicopters, airplanes, and other aerospace vehicles. Researchers study aerospace controls, guidance, cockpit displays, automation, and handling qualities of existing or proposed aircraft or other vehicles. The simulator creates a convincing environment for a pilot and is controlled by computers programmed to represent each aircraft. Computers calculate correct aircraft response when a pilot changes simulator cockpit controls. In real time, responses by the simulator include cockpit motion, images in the windshield, sounds, and control readouts. Simulations are monitored from control labs at Ames.

Information technology research at Ames is also dedicated to seamless access to resources. Imagine a national computing and information infrastructure that allowed access to the computational resources of the nation in much the same way that one accesses electrical power today. In essence, Ames

Reprinted from Spinoff 1998 Publication.

SOFIA during configuration test flight

researchers are at the forefront of creating an "information power grid" a next generation Internet architecture.

Center experts are also busy defining the prospects for human-centered computing. This work is an effort to build cognitive prostheses, that is, computational systems that leverage and extend human intellectual and perceptual capacities. Human-centered computing is aimed at building computational systems that amplify human intelligence, not substitute for it.

"Our vision in NASA is to open the space frontier. When people think of space, they think of rocket plumes and the Space Shuttle, but the future of space is in information technology."
-Dan Goldin, NASA Administrator

Applying human-centered computing to aviation operations systems is already moving forward. Goals of the work are a major reduction in aircraft accidents and a tripling in the National Airspace System capacity by 2010. To handle the vast amounts of projected air traffic and reduce accidents, computational aids are under design. The envisioned system must not only indicate past and current states of the air traffic control system, but also must be anticipatory of opportunities and risks.

A unique branch of work at Ames is in thermal protection and materials. In conjunction with small companies, the center has been developing new Ultra High Temperature Ceramics—material that will enable sharp leading edges for space vehicles. For Lockheed Martin's X-33 program, a prototype suborbital vehicle to assess single-stage-to-orbit technology, Ames is providing thermal protection system expertise to several selected areas of the experimental craft. Both the Stardust spacecraft that will snag and return comet material to Earth, as well as the Mars Microprobes built to look for the presence of subsurface ice, have counted on Ames' thermal protection system know-how.

NASA's initiative in astrobiology is a primary mission for Ames. Astrobiology is the study of life in the Universe, the story of how an infinitesimal amount of the matter of the Universe assembled into the human mind, allowing humankind to contemplate its history and determine the course of its own evolution. Bringing its interests in astrobiology and information technology together, a NASA Astrobiology Institute is being formed, managed by Ames. This institute is a national consortium of scientists focused on interdisciplinary research, while also training a new generation of researchers with the broad skills, intellect, and enthusiasm to realize the future potential of astrobiology. Indeed, astrobiology is a broad science effort. It embraces access to space missions, to study stellar nurseries in which planets form and organic molecules are synthesized, to search for life on Mars, to identify habitable planets circling distant stars, and to conduct experiments on adaptation and evolution of life in space. Astrobiology research challenges are profound. A few fundamental questions to ponder: How does life begin and develop? Does life exist elsewhere in the universe? What is life's future on Earth and beyond?

From early work in aeronautics to advanced computing technology and grappling with the origin of life—Ames Research Center stands ready to discover new worlds, generating new knowledge that stirs the soul, enhances human intellect, and enriches our lives.

The Center TRACON Automation System (CTAS) software is a set of three software tools for managing air traffic control systems at major airports. Designed to optimize flight operations, the software analyzes and predicts aircraft paths, creating visual representations of the flow of arriving traffic. It also provides controllers with up-to-the second advisories of information to pass on to pilots that will reduce time between landings to the minimum possible. The software has been integrated into the existing radar system at the Dallas/Ft. Worth Airport.

VISION, MISSION, APPROACH, AND VALUES

The NASA Vision

NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

The NASA Mission

- To advance and communicate scientific knowledge and understanding of the Earth, the solar system, and the universe, and use the environment of space for research.

- To explore, use, and enable the development of space for human enterprise.

- To research, develop, verify, and transfer advanced aeronautics, space, and related technologies.

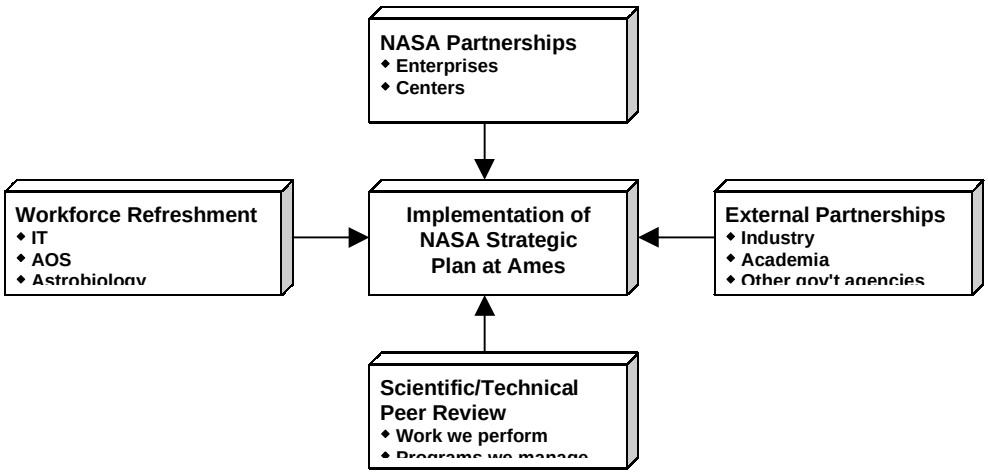
The Ames Mission

- As NASA's Center of Excellence for Information Technology, to lead and coordinate research encompassing the fields of high-performance computing and networking, human-centered computing, and automated reasoning.

- As NASA's lead center for Astrobiology, to develop science and technology requirements for current and future flight missions that are relevant to astrobiology, including advanced concepts and technology development; to identify and develop astrobiology mission opportunities, life sciences experiment for space flight, and space science research components of astrobiology; and to lead in information technology applications and astrobiology education and outreach programs that inform and inspire the American public.

- As NASA's lead center for Aviation Operations Systems, to champion research efforts in air traffic control and human factors; to lead the Agency's research efforts in rotorcraft technology; and to create design and development process tools, and wind tunnel and simulation facilities.

The Ames Approach



The Ames Values

Ames' management and supervisors recognize that people are the organization's most important assets. To ensure a work environment that accurately reflects that belief, Ames encourages and promotes adherence to the following core values:

■ Respect

We have respect for the individual and for diversity in culture, background, and experience. We maintain the highest principles of fairness and equitable treatment of all employees.

■ Communication

We recognize that only through open and honest communication will our goals be achieved.

■ Teamwork

We believe in cooperative interaction among ourselves and others. By working together with respect, trust, and mutual support, we achieve common goals.

■ Creativity

We foster creativity, ingenuity, and innovation in our endeavors.

■ Integrity

We maintain the highest principles of integrity, honesty, and accountability.

■ Excellence

We continually strive to improve. We demand professionalism in our conduct and excellence in our product.

■ Customer Focus

We are responsive to our customers and satisfy their requirements.

■ Responsibility

We are responsible stewards of the public interest, public resources, and public trust.

■ Relevance

We ensure that all our endeavors are aligned with national needs and the Agency vision and purpose.

■ Discovery

We are bold, but prudent, as we expand the boundaries of scientific understanding and technical knowledge in air and space.

January 6, 1998

Lunar Prospector Launches

There were smiles all around Ames as the Lunar Prospector spacecraft soared skyward on January 6, at 6:29 p.m. (PST) to begin the first NASA flight to the moon in 25 years.

The project was the third flight in NASA's Discovery Program of lower-cost, highly focused Solar System exploration missions. The probe was launched aboard a three-stage Lockheed-Martin Athena II rocket from Spaceport Florida's new Launch Complex 46 at Cape Canaveral.

The small robotic spacecraft was designed to provide the first global maps of the moon's elemental surface composition and the lunar gravitational and magnetic fields during the one-year, polar-orbiting mission. The craft will circle the moon at an altitude of about 63 miles. The probe also will be searching for water ice on the lunar surface.

Lunar Prospector Model

January 9, 1998

NASA, FAA Work Together on Commercial Aeronautics Project

NASA, in cooperation with the Federal Aviation Administration (FAA), is developing an automated system that could better prevent commercial aviation accidents by processing aircraft performance data - used to troubleshoot potential future aircraft problems - more efficiently.

Collectively called the Aviation Performance Measuring System, it is being developed at Ames and works by reducing the human labor needed to process large quantities of performance data generated by today's aircraft systems. This makes processing the data more efficient and enhances the data collection and cost effectiveness of present safety programs of U.S. carriers.

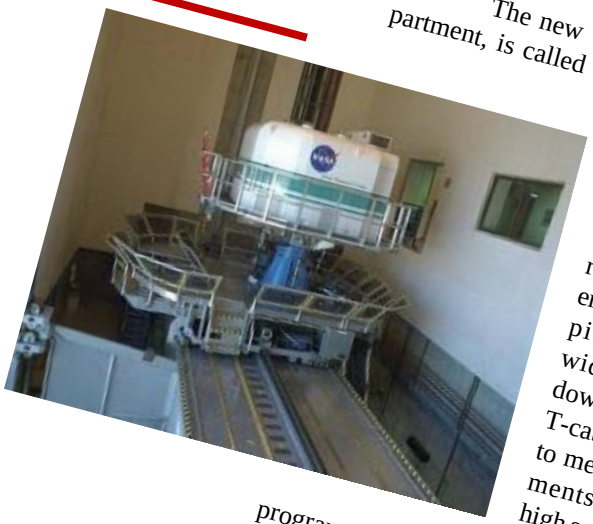
February 6, 1998

Ames Completes Major Upgrade to VMS

The world's largest airplane-space-ship flight simulator at Ames has been improved by construction of a new interchangeable cockpit.

The new "cab," cockpit-like compartment, is called T-cab and was built in-house in order to meet agency cost and schedule goals. The T-cab is being used to simulate current and future generation airliner cockpits which have wide, out-the-window configurations. T-cab was designed to meet the requirements of NASA's high speed Research and Civil Tilt Rotor programs. It is also expected that this cockpit will support future agency programs in improving aircraft safety and airspace capacity.

Exterior view of the VMS T-cab



March 20, 1998

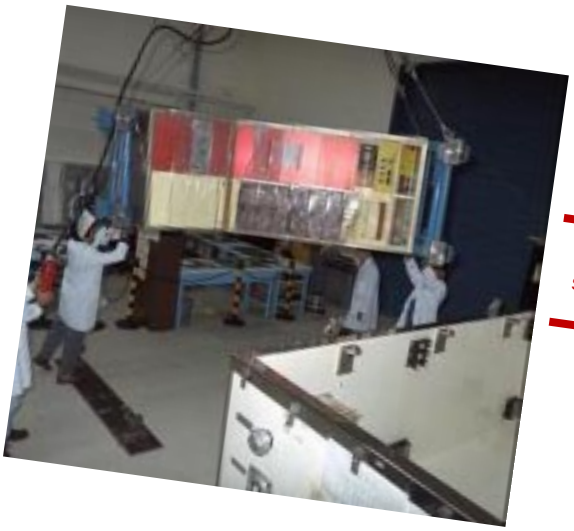
JASON Attracts Major Student Participation

Oceans of Earth and Beyond- JASON Project IX took an estimated 13,000 students from the Bay Area on a virtual expedition to some of the most interesting underwater locations in the world. The ninth project in the series focused on an interactive study of life within the structure of several ocean environments, including Bermuda and the Guaymas Basin in the Sea of Cortez.

April 16, 1998

Ames' Neurolab Payload Lifts Off

On April 16, the STS-90 mission, designated Neurolab, launched from Kennedy Space Center at 2:19 p.m. (EST). Neurolab was a 16-day research mission dedicated to the study of the life sciences. The mission examined the effects of space flight and microgravity on the functioning the nervous system. In all, Neurolab encompassed 15 experiments from Ames and 11 from Johnson Space Center on the 25th flight of the Space Shuttle Columbia.



Neurolab Animal Research Housing Facility

April 17, 1998

First Air Traffic Control Tower Simulator Takes Flight

Ames has begun construction of a full-scale air traffic control tower simulator that will provide — under realistic airport conditions and configurations — a facility that will test ways to combat potential air and runway traffic problems at commercial airports.

Researchers will look primarily at the feasibility, safety, reliability and cost benefits of technologies prior to incorporating them into airports. In addition, testing will provide information that may assist in developing proposed changes to airport ground procedures and in construction of new airport facilities.

X-36 Tailless Jet Fighter

May 15, 1998

X-36 Team Wins 1998 AIAA Award

The American Institute of Aeronautics and Astronautics (AIAA) presented the 1998 AIAA Design Engineering Award to the NASA/Boeing X-36 Tailless Fighter Agility Research Aircraft Team.

The award recognizes design engineers who have made outstanding technical, educational or creative achievements that exemplify the quality and element of engineering design. Mark Sumich, an Ames aerospace engineer who served as the X-36 project manager, and Bruno Lohmueller of The Boeing Company accepted the award on behalf of the team during an Awards Luncheon at the 39th AIAA Structures, Structural Dynamics and Material Conference held April 21 at the Westin Long Beach Hotel, Long Beach, CA.

The X-36 is a remotely piloted, advanced-research vehicle that represents a true breakthrough in aircraft design and manufacturing processes. The Boeing Company applied advanced design technology and new Integrated Production Definition (IPD) design processes to make the X-36 an extremely successful program. The aircraft was designed and built in just 28 months, and was rolled out on March 19, 1996 in St. Louis, MO. After an extensive ground test program, the aircraft first flew on May 17, 1997. The complete design and flight test program cost only $20 million, a fraction of the typical cost for a full-scale piloted aircraft to obtain the same flight test data.

May 1, 1998

Ames Invention Enters Space Hall of Fame

Temper Foam, a material first developed by NASA in the 1970s to improve seat cushioning and crash protection for airplane pilots and passengers, was inducted into the United States Space Foundation's Space Technology Hall of Fame.

Developed at Ames, the material eventually found its way into commercial products such as orthopedic support cushions, operating table pads, ear plugs, football helmets and furniture cushions. The foam is also used in Space Shuttle seats. Temper Foam takes the shape of impressed objects, but returns to its original form even after 90 percent compression.

Evaluation demonstrations of Ames CTAS system at the Air Traffic Control Center in Longmont, Colorado

June 12, 1998

Wind Tunnel/Simulator Divisions Pass ISO Certification Audit

DNV auditors announced on May 28 that the Wind Tunnel Operations Division (Code FO) and the Simulation Operations (Code AFO) and Systems (Code AFS) Branches, formerly Code AO, passed the ISO certification audit with no major nonconformances. After the organization sends DNV a plan for corrective actions for the eight minor nonconformances found, DNV will issue the official ISO Certificate. As a team of civil servants and contractors, the former AO Division has reached their 2 1/2 year goal to become ISO certified.

July 10, 1998

Goldin Invites High Tech Silicon Valley Companies to Partner with Ames

Noting that NASA's long-term, high-risk research leads to long-term benefits and high-payoff products, Administrator Daniel Goldin invited leading Silicon Valley companies to partner with Ames to develop revolutionary aerospace and information technology tools for the future.

During a June 26 luncheon address before the Silicon Valley Forum of the Commonwealth Club of California, Goldin urged those in attendance to locate their companies at the sprawling Ames Moffett Complex.

"If you are willing to work on the revolutionary technology leaps that are both critical to our missions and profitable to your companies, we'll provide the land to do that here at Ames," Goldin told his audience gathered in the Moffett Training and Conference Center. "Discussions are already underway with the cities of Sunnyvale and Mountain View, companies like IBM, Xerox and Silicon Graphics, and universities such as Stanford and Santa Clara, to start these Information Technology Research Institutes."

According to Goldin, only by working together can the exciting new technologies -"the ones that are going to be propelling us to the furthest reaches of the solar system and beyond" - be developed. "I am here today to say that NASA and Ames are committed to that," he said. "We are committed to using all our resources - including our land-to make that happen." The Administrator said that he looked forward to returning to Ames when the agreements are finalized. "I gave Harry McDonald a one-year deadline and he said Ames is going to meet it," he said.

July 24, 1998

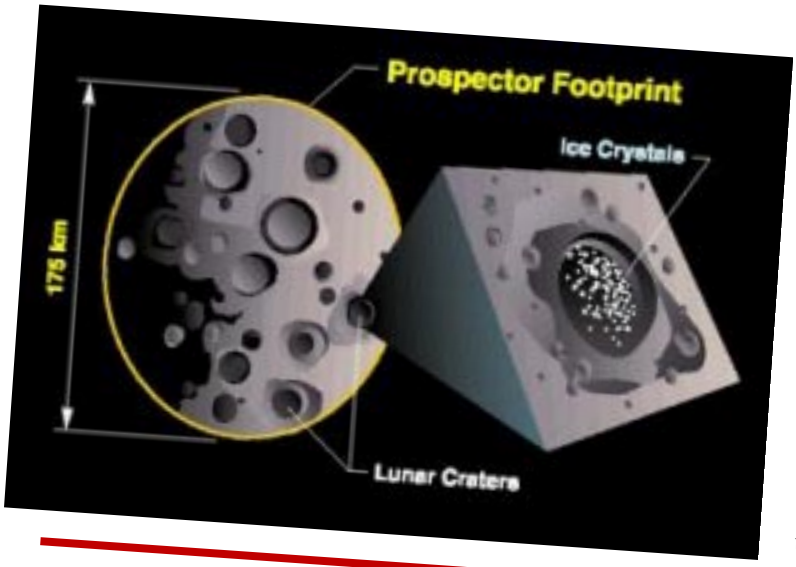
CTAS Software Wins Top Award

The Ames-developed Center TRACON Automation System (CTAS) software was selected as a winner of NASA's 1998 Software of the Year award.

Lee B. Holcomb, NASA Chief Information Officer, and Dr. Daniel R. Mulville, NASA Chief Engineer and Chair of NASA's Inventions and Contributions Board, selected the winners. The award is given annually by the Inventions and Contributions Board to NASA-developed software that has significantly enhanced the Agency's performance of its mission and helped American industry maintain its world-class technology status.

The Center TRACON Automation System software is a set of three software tools for managing air traffic control systems at major airports. Designed to optimize flight operations, the software analyzes and predicts aircraft paths, creating visual representations of the flow of arriving traffic. It also provides controllers with up-to-the second advisories of information to pass on to pilots that will reduce time between landings to the minimum possible.

The software has been integrated into the existing radar system at the Dallas/Ft. Worth Airport. Software displays in the control room supplement the manual air traffic control system. Use of the program saves an average of two minutes per flight, in turn saving money for the airlines and passengers. The Federal Aviation Administration has chosen the Center TRACON Automation System for immediate implementation into all major airports and estimates its use could save airports as much as $800 million annually.



Prospector's neutron spectrometer can sense water ice (hydrogen) down to a depth of a half-meter (a couple of feet). According to previous estimates predicted by the scientific community, the lunar soil has been effectively "gardened" to a depth of 2 meters by meteoritic impacts over the past 2 billion years.

September 4, 1998

Ames' Lunar Prospector does it again!

Lunar Prospector, "the little spacecraft that could," is astounding the planetary research community yet again. Just five months after it sent a wave of excitement across the globe with the announcement that water had been detected at both lunar poles, recent data from the Ames-managed, $63-million mission threatens to force nothing short of a systematic re-evaluation of existing theories of lunar formation, evolution and history.

According to a series of articles published in the September 4th issue of Science magazine, researchers now estimate that up to six billion metric tons of water ice may be trapped at the Moon's poles. This represents a more than ten-fold increase over the most optimistic previous projections. Further, growing evidence suggests that the water ice may be buried in relatively high-concentration deposits in the permanently shadowed lunar polar craters.

Researchers also report detection of strong, localized magnetic fields; delineation of new mass concentrations on the lunar surface; and mapping of the global distribution of major rock types, key resources and trace elements. In addition, there are strong suggestions that the Moon has a small, iron-rich core.

IMPROVING AIRLINE SAFETY

Three-dimensional (3-D) simulation software for virtual reality applications has found new utility in the airline industry. Thanks to the efforts of Steve Lakowske, founder of SimAuthor Inc. of Boulder, Colorado, a flight data visualization system called FlightViz™ has been created for NASA's Aviation Performance Measuring System (APMS), resulting in a comprehensive flight visualization and analysis system. The visualization software is now capable of very high-fidelity reproduction of the complete dynamic flight environment, including airport/airspace, aircraft, and cockpit instrumentation.

The APMS program calls for analytic methods, algorithms, statistical techniques, and software for extracting useful information from digitally-recorded flight data. APMS is oriented toward the evaluation of performance in aviation systems, particularly human performance, Lakowske explains.

Lakowske is a ten-year NASA veteran, formerly employed at the Ames Research Center. He attributes much of his success to the years of NASA work in computational human performance modeling. His NASA experience in simulation technology began at Ames in 1979, working as an electronics engineer in the Electro-Systems Engineering Branch.

Flight data are routinely analyzed by many non-U.S. carriers to measure the safety, training, and efficiency of their fleet operations. There are many ways of using digital flight data for these purposes. One of the specific goals of the APMS research project cites the need for enhancing and facilitating animated playback of data from individual flights to assist data analysts, and to provide effective feedback for training and self-assessment of air crews.

Pilots, instructors, human factors researchers, incident investigators, maintenance personnel, flight operations quality assurance staff, and others can utilize the software product to replay flight data from a flight data recorder or other data sources, such as a training simulator. The software can be customized to precisely represent an aircraft of interest. Even weather, time of day, and special effects can be simulated.

Among the key benefits of the software product is its ease of use. Drawing from simulator databases of airports and public domain cockpit instrumentation, the software lessens user training time due to intuitive graphical user interfaces.

Now adopted by United Airlines, SimAuthor's state-of-the-art flight data replay system is enhancing safe, day-to-day operations of aircraft and bolstering confidence in air travel by the flying public.

SimAuthor software features textured 3-D scenes and high-fidelity reproduction of an aircraft's complete dynamic flight environment.

HIGH-TECH, LOW-TEMP INSULATION

The fiery reentry of future reusable space planes can receive a cool reception as they slam into the Earth's atmosphere by using a new lightweight metal insulation. That same technology has been applied to the creation of emergency rescue blankets and mittens capable of thwarting extremely cold weather.

S.D. Miller & Associates of Flagstaff, Arizona has received Small Business Innovation Research (SBIR) contracts through the Ames Research Center. The company is operated by Steve Miller, who has served as the principal investigator on several NASA SBIR awards over the past 11 years.

The SBIR work has launched an investigation into a unique flexible insulation blanket suitable for the thermal protection systems of future spacecraft during atmospheric entry. A low-density, honeycomb-like material was fabricated, capable of inhibiting convective and radiative heat transfer. This advanced, but lightweight, insulation was made from special metal alloys and ceramics. Shaving off any weight from a reusable launch vehicle means a decrease in fuel and frame weight and, ultimately, lowers the cost of hurling each pound of payload into space.

Yet another commercial product is emerging from the space program work. Mittens are now in production that are warmer than wool and made from recycled plastic.

The mittens are designed for people in extreme cold weather, including recreational, industrial, and military users. Informal field testing of the mittens has been carried out in the frozen climes of Antarctica, Miller reports.

Silk is used as a glove lining for greater breathability and extra comfort. A waterproof/breathable shell on the outside of the product facilitates faster drying. Glove palms use a rubberized material for better grip.

Since hands perspire more than other parts of the body, handwear often gets damp and this moisture greatly increases heat loss from the hands. "Our honeycomb insulation doesn't trap moisture, so hands stay warmer," Miller says. "Active people from snowboarders to driveway shovelers will benefit since perspiration increases with greater activity," he adds.

Other spinoff insulations are also deemed feasible. The Whirlpool

Reprinted from Spinoff 1998 Publication.

Material to protect reentering space planes is an ideal glove insulator for keeping hands warm in cold, harsh climates.

Corporation is evaluating the material as a moisture-tolerant alternative to chlorofluorocarbon (CFC)-blown foam that would make their refrigerators even more efficient. Units that hold and maintain super-cold fluids, and other industrial applications would also benefit from the technology's unique advantages.

■ ENTREPRENEURIAL ASPIRATIONS

"Intelligently Interactive Web Sites" is a marketing declaration of MiraNet, Incorporated, a Silicon Valley startup with proprietary software expanded from an expert system long used at NASA.

MiraNet of Palo Alto, California is one of two companies that have spun off from Recom Technologies of Roseville, California. The other firm, Attention Control Systems, Incorporated of Mountain View, California is utilizing intelligent planning software that Recom developed for the Ames Research Center's (ARC's) Computational Sciences Division.

Attention Control Systems focuses its energies on a hand-held device, employing real-time planning software together with neuropsychology therapy concepts. This device is being prepared as an aid in cognitive rehabilitation of brain injury patients. It can also assist other people with psychological disorders such as Alzheimer's Disease and Attention Deficit Disorder. The core system makes use of intelligent planning software that Recom developed for ARC. The hardware provides patients with detailed daily activity scripts with the help of their therapists and provides a major step into autonomous living.

MiraNet was founded to bring NASA technology to the Internet and the Web, and its first product, WEXpertTM, is a web-enabled version of the NASA-developed, rules-based expert system called CLIPS.

WEXpert guides web visitors to answers in an intelligently interactive process. Although the system appears to be a web site, there are only the WEXpert engine plus a knowledge base in the form of text-based rules. Web pages are automatically generated for each visitor based on the answers given during a consulting session. No technical programming is needed to set up a WEXpert Guided Web, only English-like rules that reflect the type of knowledgeor expertise being dispensed.

Where typical web sites are a jungle of information requiring perseverance, search engines, and Internet surfing skills, WEXpert guides you to answers or advice. It is targeting corporations who wish to enhance customer service or provide web-based sales advice. The growing frustrations of telephone menus and waiting for human support are turning a growing population of people to web sites for help. WEXpert will make web sites friendlier and more productive, says Alex Cheng, President of MiraNet.

■ REAL WORLD AUDIO

Acoustic bliss—an interactive, real-life audio experience by surrounding the listener with sounds in three dimensions using only a single pair of ordinary speakers or headphones. Getting an earful earns an entirely new and enjoyable meaning thanks to the audio know-how of Aureal Semiconductor, Incorporated of Fremont, California, and its subsidiary, Crystal River Engineering (CRE), Incorporated of Palo Alto, California.

By furthering what is termed psychoacoustic research, audio standards have been raised to new dimensions. Aureal has embraced this research, creating innovative technology that alleviates the need for pre-encoding sounds or adding extra speakers to achieve "virtualized" experiences. The 3-D audio technology enables interactive placement of sounds in the entire 3-D space surrounding a listener. The advantage is obvious: A new generation of audio experience that is interactive, immersive, and fully three-dimensional.

Audio accelerators, for instance, can turn a computer into a thundering, true-to-life sound machine equal in quality to home theater surround sound systems. The result is a transformation of game playing into a visual and audio romp, immersing the user in a more interactive experience.

Aureal has been able to bring 3-D audio from NASA's high-end research work in jet cockpit displays and flight simulators to mainstream electronic entertainment, consumer electronics, and communication applications. Applying that research has brought a level of awareness, realism, immersion, and engagement to the user, once only possible in real-life situations. By enveloping a listener in a three-dimensional sound field, a user is no longer aware of the audio system that is rendering the sounds.

Indeed, a new level of audio experience...and a sound investment in the future.

A high-speed digital audio processing system enables three-dimensional sound to be used in numerous consumer products, from computer games to home entertainment equipment.

A VIRTUAL WORLD OF VISUALIZATION

Under the hood and through the furnace.

Those are two places where industry has gained cost-saving advances from spinoffs of NASA aerospace computer technology. That is the way that M. Gene Konopik sees it as President, Federal Systems Group of Sterling Software, Incorporated in McLean, Virginia. Sterling Software has had a 25-year history with NASA.

Advanced three-dimensional (3-D) interactive graphics were pioneered at the Ames Research Center (ARC). These same tools have been adapted and adopted in ways that now help advance automotive virtual reality models, heat flow in furnaces, and air pollution.

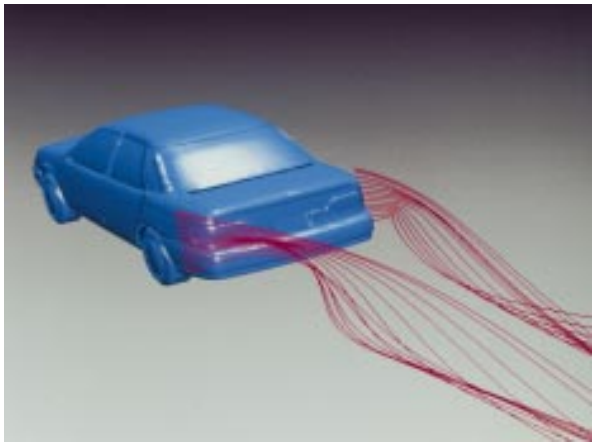
Starting in the early 1980s, ARC made significant investments in pioneering research and development for scientific visualization. ARC developed 3-D graphical data formats and basic graphics codes for displaying computational fluid dynamics (CFD) results.

Sterling Software began assisting NASA by building the first workstation software packages for 3-D scientific animation. While these early packages were originally built for aerospace CFD graphics, prospects began emerging for many other applications in visualizing similar 3-D grid-oriented data.

In 1990, Sterling Software developed a toolkit for ARC on contract. As a workstation-based modular analysis and visualization tool, animated grids and grid-oriented data can be derived. While constructed in modules, each module of the tool operates as an independent process. They are under control of a central process that maintains the toolkit's data in shared memory. A few of the current modules include: interactive surfaces, vectors and contours; generation of isosurfaces and arbitrary cutting planes; unstructured data analysis; grid quality, resolution, and geometry inspection; and computation of scalar and vector CFD functions and custom algorithms.

Sterling Software's visualization toolkit is most widely used for reviewing fluid flow and similar types of grid-oriented 3-D data. The Space Shuttle, jet engine turbine internal flows, vertical short-takeoff-and-landing ground effect research, and the vortex dynamics of whirling helicopter blades—these are examples of technologies where the visualization software has proven of great merit.

On a non-exclusive basis, Sterling has created special-purpose versions of its software toolkit. Designed with industry and non-NASA customers in mind, the visualization software can now be run on a wider set of workstations. Ford Motor Company, for example, has made use of Sterling's toolkit and modules to visualize under-hood and under-body air flow and heat build-up. Sterling engineered a special package of virtual reality-based computer software to help Ford shape interactive virtual work sessions. The automaker is investigating ways engineering and design personnel—either at the same spot or distant locations—can dynamically adjust a mathematical car model, observing the impact of those alterations in real-time or near real-time.



Sterling Software's visualization technology has made a mark on the automobile industry by allowing under-the-hood changes in a virtual reality simulation.

PLANNING FOR "WHAT IF" SCENARIOS

You think you have a busy schedule? Try running the Hubble Space Telescope!

Now the most successful scheduling technology ever developed for NASA is available to customers who want to minimize production costs while maximizing throughput.

The founders of Interval Logic Corporation of Sunnyvale, California were the developers of the SPIKE scheduling system specially created for NASA's orbiting observatory, the Hubble Space Telescope. The operational efficiency of the astronomical eye-in-the-sky was doubled by the scheduling software. This same system has now logged over 60,000 hours of operation in mission-critical applications, managing assets worth billions of dollars.

Interval Logic has introduced its SPIKETM scheduling software on a commercial basis, targeted at the semiconductor industry. The product can dramatically streamline semiconductor production. Semiconductor manufacturing operations comprise some of the most difficult and complex of all manufacturing scheduling problems in business today. The frequent challenges of innovation in this industry require adaptation to constant change. Global competitiveness creates intense pressure on production managers to effectively manage manufacturing cycles and cut costs.

To answer semiconductor industry needs for dramatic increases in handling demand, along with optimizing fabrication and backend operations, Interval Logic has created a scheduling and optimization product family.

With a click of the mouse, lot rescheduling, machine availability, and product cycle times are effortlessly manipulated. Easy to use, the software planning and scheduling system can provide visibility and control over semiconductor manufacturing operations—from wafer release through final test.

Despite billion-dollar-plus fabrication investments, overall utilization can be as low as 30 percent. That is a tremendous cost drain, says Rosenthal, President and founder of Interval Logic. To optimize profits in these high cost fabrications, chip makers must elevate their utilization factors. "It's a pervasive challenge," he adds.

Taking a look at the business end of semiconductor manufacturing, by better production optimizing, obvious objectives are achieved—increased profitability, reduced overhead, and ensured cus-

tomer satisfaction.

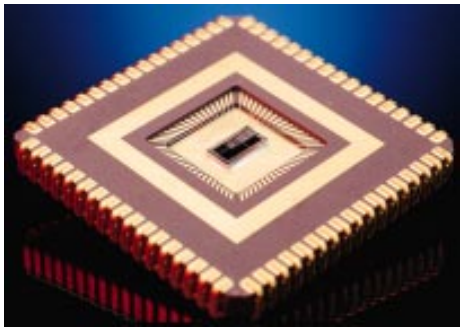
Interval Logic has evolved a set of products that provide a leverage—the power to act effectively—software for making hard choices easier.

ANTI-HASSLE CHIP

It is estimated that over 25 million people worldwide have Internet connections. That number is on a fast-moving growth curve daily. However, four out of five people in the United States still remain "Internet no shows." They remain unconnected due to two primary obstacles: the lack of a personal computer and the perceived complexity of getting on the Internet.

With assistance from Ames Research Center, the iTv Corporation (iTvc), a San Mateo, California-based startup, has introduced a computer chip that minimizes the hassle of logging onto the Internet. The work by iTvc was supported by the Ames Technology Commercialization Center, an organization that "incubates" small businesses. With $900,000 in venture capital funding, raised while in the NASA Ames business incubator, the company was able to proceed with development and rollout of its first innovative product.

The company's first product to graduate from the incubator was built to link the Internet to the television, providing a high quality image for electronic mail (email) and World Wide Web browsing. The device uses a proprietary 400 MIPS (millions of instructions per second) throughput microprocessor chip, which was developed during iTvc/NASA collaborative projects.



Smarts on a chip. This multiprocessor is the brain behind iTvc's low-cost approach to making the Internet available through the television. The micro-processor is adapted from electronics technology designed for robotic Mars missions.

Instead of using a personal computer, iTvc hardware uses an existing television and telephone line to connect the user to the Internet. With 98 percent of all U.S. households owning a television, the potential market for the equipment is large.

The company has developed a full custom microprocessor that will enable access to the Internet through an inexpensive device and keyboard. The 100-MHz chip uses a 20-bit wide internal data bus to process 4 instructions per clock cycle. The power of the processor is low, some 90 milliwatts. That is a fraction of the memory and power of conventional microprocessors. Although the primary application of the microprocessor is for Internet access applications, other data path options and coprocessor arrangements can be implemented.

Other uses of the microprocessor include cell phones, DVD players, cable modems, video conferencing equipment, digital cameras, and wireless local area networks and wide area networks. In general terms, the iTvc microprocessor supports at least a $100 reduction in costs of mass market consumer electronics, relates Gary Langford, President of iTvc. That means big business, he says.

POWER PLAY-LASER STYLE

Exciting research in the areas of physical chemistry, biochemistry, and atomic physics can be studied utilizing the first commercially available single-frequency laser diode system.

SDL, Inc., San Jose, California, is a leader in the design, manufacture, and sale of semiconductor lasers, optoelectronic integrated circuits, and system and fiber optic-related products.

With partial support from the Ames Research Center's (ARC's) Small Business Innovation Research (SBIR) program, SDL has demonstrated and started marketing the first high-power, single-frequency continuously tunable laser diode system suitable for high-precision spectroscopy. High power gives the laser unprecedented attributes. Tapping more than a half watt of power, the SDL

High-power, single frequency continuously tunable commercial laser diode system. The compact system opens up research prospects for studies in biological and atmospheric processes, and for pollution monitoring.

TC40 laser operates in the mid-infrared spectral regions. With frequency doubling, laser light in the UV and visible regions can be generated. It has several advantages over other mid-infrared lasers, including high reliability, lower power consumption, room temperature operation, and compact size.

The NASA connection to the laser's creation is part geological, part biological, and part atmospheric. Mid-infrared laser sources are of interest because many geologically and biologically important gases have strong absorption lines in this spectral region. Absorption is the process in which radiant energy is retained by a substance.

Mid-infrared spectroscopy has several additional NASA applications, including the monitoring of gas concentrations in spacecraft cabins, measuring atmospheric gas concentrations, and analyzing meteorites.

Commercial applications for mid-infrared gas sensing include pollution monitoring of factory and automobile emissions.

The building of high-power, single-frequency continuously tunable laser diodes will enable further expansion of new spectroscopic applications. By offering performance that was previously available only from tabletop-sized complex laser systems, this laser diode technology is expected to bring powerful analytical techniques out of development laboratories and into widespread commercial use.

JASON

The JASON Project, named after the Greek mythological character who reclaimed the Golden Fleece, embodies Robert Ballard's goal of showing kids that science and technology can be exciting and accessible. Ballard found the wreckage of the sunken Titanic in 1985 and started the project after receiving 15,000 letters from kids who wanted to know every detail of his discovery. The rest is history— and a valuable learning and educational experience for thousands of students and their teachers. This year's theme, "Oceans of Earth and Beyond," took an estimated 13,000 students on a virtual expedition to some of the most interesting underwater locations in the world.

Ames Aerospace Encounter

Created for fourth, fifth, and sixth grade students, NASA's Ames Aerospace Encounter is a unique, interactive program designed to stir young people's imaginations and fuel their enthusiasm for science, mathematics, and technology. Located in a renovated supersonic wind tunnel, this classroom facility makes math and science curriculum come alive through cooperative discovery.

Adopt-a-Family

Each year, the employees of the Office of the Chief Financial Officer join together to make the holiday season special for those less fortunate than they are. For the last five years, they have sponsored two or three families as part of the Getting Involved for the Season (GIFTS) program at the Mountain View Support Network for Battered Women. The Acquisition Division has also joined this effort and sponsored their own families the last two years. They receive wish lists and collect donations of new clothing, toys, and gift certificates for their families. For the last two years, they have focused on contributing gift certificates for clothing, toys, and groceries so that the mothers have the opportunity and pleasure of shopping for their own children.

In addition, for the 1998 holiday season, employees expanded their giving to the Mountain View Community Services Agency. They contributed funds to rent a motorized wheel chair for a senior citizen who was confined to a wheelchair and temporarily lost the use of his hands.

The generosity and thoughtfulness of these employees, exemplifying the spirit of Ames, made the holiday season special for their families and truly appreciated as evident in their thank you letters.

Educator Resource Center (ERC)

The Educator Resource Center provides resources to teachers so they may develop their own educational programs. Teachers gather ideas, do research, and duplicate audiovisual materials. ERC materials reflect NASA research and technology development in such curriculum areas as life science, physical science, astronomy, energy, earth resources, the environment, mathematics, and careers in aerospace.

Space Camp

Ames worked with the city of Mountain View to bring Space Camp California to Moffett Field. Although Space Camp California is neither operated by NASA or Ames, on-site land and services are made available to the Space Camp Foundation, making this educational adventure possible.

Disaster Assistance and Rescue Team (DART)

DART was formed in 1986 at the request of the Director of Ames Research Center. The intent was to train and equip a team that was capable of responding to the type of disasters that the Center would likely encounter. It started out as a small group of volunteers with few skills and very little in the way of equipment. Today it is a fully functional emergency response team that is not only capable of dealing with potential Center disasters, it is also capable and prepared to respond off Center to support the community as a fully functional Urban Search and Rescue Team. DART is one of this countries most qualified and best-equipped emergency response teams.

Combined Federal Campaign

Each year, the Combined Federal Campaign gives Ames' employees the opportunity to support local, national, and international charities. During the 1998 Campaign, Ames contributed over $215,000, exceeding its goal and making it the largest contributor in Santa Clara and San Benito County.

"Quest"- The K-12 Internet Initiative

Located on the Ames Home Page, QUEST provides support and services for schools, teachers, and students to fully utilize the Internet, and its underlying information technologies, as a basic tool for learning. At this web site, students can interact with the people of NASA, join in select NASA events, and access a wealth of information.

Speakers' Bureau

The Speakers' Bureau provides speakers for educational institutions, business organizations, service clubs, and professional and technical societies. Employees volunteer their time and speak to these groups on a wide range of topics including space, aeronautics, and information science.

RECOGNIZING EXCEPTIONAL PEOPLE

American Institute of Aeronautics and Astronautics (AIAA) Fellows

Dr. Henry McDonald, 1998
Dr. Dallas Denery, 1999
Dr. Daniel Reda, 1999

1998 AIAA Design Engineering Award

NASA/Boeing X-36 Tailless Fighter Agility Research Aircraft Team

NASA 1998 Software of the Year Award

Center TRACON Automation System Software (Co-Winner)
Overset Tools for CFD Analysis (Honorable Mention)

1998 Space Act Board Award

Panel Method Ames Research Center (PMARC)
Mars Virtual Exploration
Thermal Protection Systems Expert and Material Properties Database (TPSX)
New Millenium Program (NMP) Electronic Collaboration and Document Sharing System
Portable Batch Systems (PBS)
Publishing on the Web

1998 NASA Honor Awards

Outstanding Leadership Medal
William E. Berry
G. Scott Hubbard
James L. Martin
Kenneth A. Souza

Exceptional Achievement Medal
Ronald G. Lamica, Sr.
John R. Lekashman
Charles C. Jorgensen
S. Scott Santiago
Karen E. Tambua

Exceptional Engineering Achievement Medal
Robert W. Meneely
Huy K. Tran

Exceptional Scientific Achievement Medal
David F. Blake
Timothy J. Lee
Hanwant B. Singh

Exceptional Service Medal
Warren F. Ahyte
Rodney O. Bailey
Lewis S. G. Braxton, III
Kevin Corker
Michele Eshow
Abdelaziz (Abdul) Hanif
Diane M. Kanally
Matilde P. Shallenberger
Leonard Tobias
Barbara J. Young

Public Service Medal
John S. Bull
Albert Globus, Jr.

Group Achievement Awards
Ames Community Day Open House Team
Ames Mars Pathfinder Support Team
Bion 11 Biosatellite Team
DC-8 Aircraft PACRIM Team
DC-8 Aircraft SONEX Team
Intelligent Flight Control Group
POLARIS Project Team
X-36 Flight Test Team

1998 Ames Honor Awards

Administrative
Thomas W. Berndt
Deborah A. Renick
Linda M. Vollenweider

Best First Paper by a Junior Researcher
Gregory C. Carr

Continual Improvement
Bob Wong

Contractor Employee
Susanne C. Ashby
Thomas S. Burnett
Mark Clark
Michael R. Derby
Lisa Marie Gonzales
Stephen Jackson
Cetin Kiris
Norbert M. Ulbrich
Johannes M. Van Aken
Diane Vaswig
Ethiraj Venkatapathy

Equal Employment Opportunity
Michael L. Marlaire

Engineer
Alan R. Boone
Scott Jensen
Joseph J. Totah

Group/Team
Ames Deep Space 1 Remote Agent Team
Joint Strike Fighter Simulation Project Team
Transport Cab (TCAB) Project Team
Wind Tunnel and Simulation Divisions ISO Certification Team

Headquarters Employee
William C. Stamper

Mentor
Sandra C. Lozito
Mark Mallinson

Scientist
Charles Chackerian, Jr.

Secretary/Clerical
Ginny Rochette
Margie Stathes
Hope T. Wilden

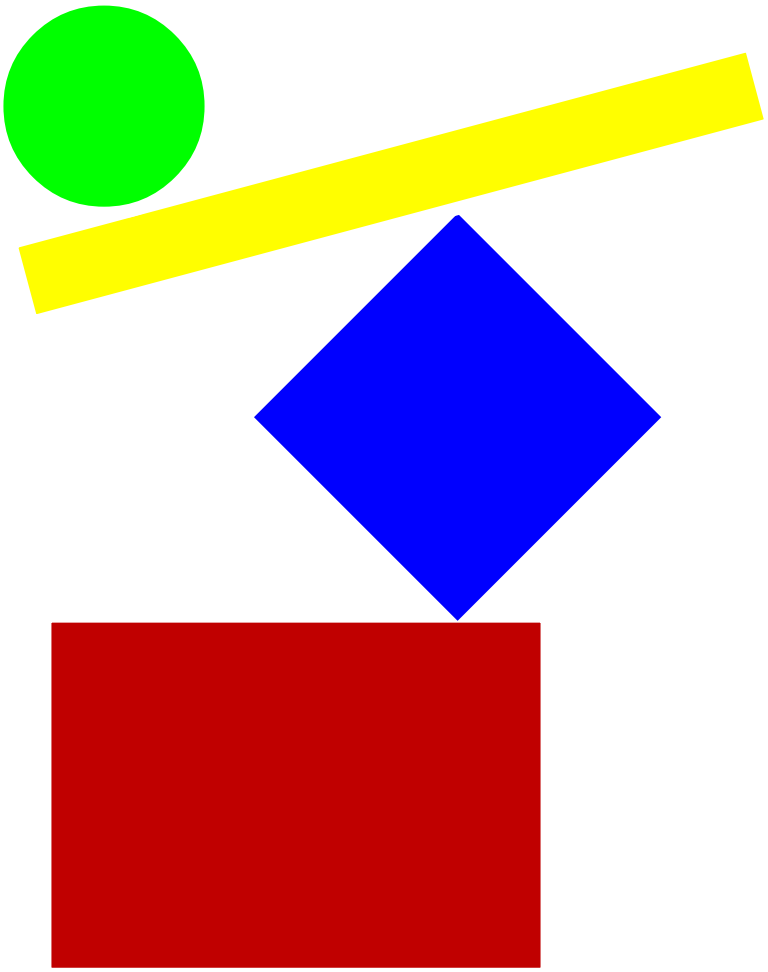
Student
Kellie A. Chau
Akili P. Nickson

Supervisor/Manager
Sanford S. Davis
William G. Warmbrodt

Technician
Samuel Caires
William K. Chun

Technical Support
Danielle J. Goldwater

Management Discussion & Analysis



MANAGEMENT DISCUSSION AND ANALYSIS

The following discussion and analysis provides information which management believes is relevant for a proper assessment and understanding of the Center and its missions.

A. Management Initiatives

■ Full Cost Management

The National Aeronautics and Space Administration (NASA) plans to implement new full cost practices during the next few years to improve the cost effectiveness of mission performance. This initiative includes policy and practice improvements in the accounting, budgeting, and management areas and is expected to provide complete cost information for more fully informed decision making. NASA plans to associate all Agency costs (including Civil Service personnel costs) with major projects and to budget, account, report, and manage these activities from a full cost perspective.

NASA's "full cost" initiative integrates several fundamental accounting, budgeting, and management improvements. The planned improvements include accounting for costs as direct, service, and general and administrative (G&A), budgeting for full project costs and managing such projects from a full cost perspective. Briefly stated, direct costs are those which can be obviously and/or physically linked to a particular project, service costs are those which cannot be readily or immediately linked to a project but can subsequently be traced to a project, and G&A costs are support costs which cannot be linked to any specific project in an economical manner. Under full cost practices, service costs will be "charged" or assigned to a project based on project-controlled use of the service; and G&A costs will be allocated to projects in a consistent, logical manner based on a metric that indirectly relates G&A costs to projects.

All costs will continue to be controlled and managed within NASA. Under full cost management, however, project managers, who have the most direct mission responsibility and intimate project knowledge are expected to continue to control direct costs but are also expected to have greater influence over service and G&A costs. Such control/influence is not unconstrained. At the same time, Enterprise and Center management are expected to continue to guide Center capabilities consistent with strategic imperatives.

NASA's full cost initiative will also support "full disclosure" on activities and improve matching of costs with performance. In that regard, this initiative is also consistent with sound business practice and recent legal and administrative guidance, including the 1990 Chief Financial Officers Act, 1993 Government Performance and Results Act, 1993 National Performance Review, Federal Financial Management Improvement Act of 1996, and NASA's 1995 Zero Base Review.

a. Background

NASA initiated its full cost effort in 1995 in response to direction from the Administrator, emerging Federal cost accounting standards, and evolving management information requirements. This initiative has been managed by a team that includes Headquarters and Center managers with support from public accounting and academic experts. It is being pursued in phases: (1) Concept Phase (1995), (2) System Requirements Phase (1995/6), (3) Prototype Phase (1996), (4) Agencywide Test Phases (1997/9), (5) Implementation Phase (1999) and (6) Operational Phase (2000).

b. Progress

During 1995, the full cost team visited with industry representatives and other Federal agencies and developed a concept and approach for implementation of full cost practices. This concept and approach were reviewed by Senior management and approved by the Administrator in early 1996, thus completing the concept phase.

During early 1996, NASA also completed the System Requirements Phase. The full cost team identified basic cost accounting, budget and management requirements to support the full cost initiative. These requirements were integrated into the ongoing Integrated Financial Management Project (IFMP) in early 1996. (The IFMP is a system initiative designed to acquire and implement an integrated system to support critical Agency information requirements, including full cost management, scheduled for 1999.)

Also during 1996, a reconstituted full cost team directed ongoing prototype testing activities, which involved evaluating the full cost concept and approach at three Centers and at Headquarters. To achieve the objectives of the prototype test, each of the four prototype locations recast its FY 1995 cost data into a full-cost format. This activity demonstrated analytically using cost finding techniques that full-cost practices can be implemented in NASA. It was also clearly demonstrated that current systems cannot support full-cost practices efficiently and that the IFM system is a pre-requisite for implementing operational full cost practices across the agency.

The interval between completion of the prototype phase and the implementation of IFM provides the opportunity for testing full cost budgeting and accounting at all Centers. In the first year of the Agencywide test phase, efforts were focused on (1) testing full-cost budgeting by recasting the FY 1999 budget into a full cost format; (2) testing full-cost accounting by applying cost finding techniques to six months of FY 1997 accounting data to determine program/project costs; and (3) identifying issues which need to be resolved before full cost implementation.

c. Plans

During 1998 and 1999 NASA plans to continue the Agencywide Test Phase and implement/test full cost management and accounting at "Pathfinder" centers. The full-cost initiative has evolved considerably during the preceding phases as issues arose, alternative approaches were developed and evaluated, and solutions were chosen. Similarly, the full-cost concept is expected to evolve during the remainder of the Agencywide test.

■ Integrated Financial Management Project (IFMP)

NASA's Chief Financial Officer, Arnold Holz, initiated the Integrated Financial Management Project (IFMP) in March 1995 to implement common agency-wide solutions for many of NASA's business and administrative processes. A number of external, as well as internal, factors drove the establishment of this project. Externally, the Office of Management Budget (OMB) and the General Accounting Office (GAO) directed federal agencies to implement financial systems compliant with the Joint Financial Management Improvement Program (JFMIP), a multi-agency cooperative effort to improve government financial management practices. Internal reviews, including NASA's Zero Base Review, also stressed the need to implement a common set of business systems to eliminate non-integrated systems and Center-unique procedures and practices. These external and internal drivers, coupled with the cancellation of the NAFIS and TALC/LD development efforts, placed significant focus on the IFMP.

Supporting the need for integration and common processes, NASA targeted commercial-off-the shelf (COTS) software packages to meet most, if not all, of the Agency's business requirements. IFMP's initial phase will focus on several functional areas: core financial (Standard General Ledger, accounts payable, accounts receivable, etc.), budget formulation and execution, procurement, time and attendance, travel, and asset management. Phase II will address personnel, payroll, grants, and revenue systems. NASA will also establish an Executive Information System (EIS) and/or Decision Support capabilities as applications are implemented.

a. Background

With the award of the IFMP contract in late September 1997 to KPMG Peat Marwick, the transition to the new system began with the start of fiscal year 1998. Initial efforts were oriented toward NASA learning the fundamental capabilities of KPMG's Performance Series Software and KPMG learning the fundamentals of NASA financial and business processes. Center team members worked with their counterparts in the Agency and KPMG to document the new business processes and to develop detailed requirements and interfaces with the Integrated Financial Management System (IFMS).

Due to the size and scope of the new IFMS and resource constraints, the IFM Program Office, with KPMG's Program Manager, made a decision to modify the scheduled implementation throughout the Agency. The impact of this decision was to delay implementation at the first Centers, Marshal Space Flight Center and the Dryden Flight Research Center, from July 1, 1998 to June 1, 1999. This also translated into an 11 month change to the implementation date for Ames, making Ames' new implementation date June 1, 2000.

b. Progress

The Agency process teams spent the last nine months of 1998 configuring the IFM system tables, participating in KPMG's in-house testing of their software, and developing test scripts for validation testing.

The IFMS software was delivered to the IFMP Integrated Test Facility in December 1998. The Agency's testing of this software began in December and is scheduled to continue for several months until the full functionality of the software has been successfully demonstrated.

c. Plans

In addition to testing and accepting the software, major efforts are underway with KPMG to develop system interfaces with other government agencies and other Agency-wide systems. Training programs are being developed to equip employees with the skill sets needed to succeed in the new IFMP environment.

Also, a formal data clean-up effort, started in 1998, will continue in 1999. The success of the data clean-up effort will have a direct impact on Ames' successful conversion to IFMP in June 2000.

The Integrated Asset Management Phase of the IFMP will continue with the further refinement of requirements and with the issuance and evaluation of responses to Request for Information. Initial efforts have begun to identify requirements for Human Resources, Payroll, and Grants Management, all of which comprise Phase 2 of the Integrated Financial Management Project.

■ ISO 9001

ISO 9000 is a series of standards and guidelines that define the minimum requirements for an effective quality system accepted internationally. An organization can demonstrate compliance to either the ISO 9001, ISO 9002, or ISO 9003 standard through the process of registration. Registration of an organization's quality system occurs upon the successful completion of a third-party audit against the standard by an accredited registrar.

ISO 9001 is the most comprehensive in scope, confirming process conformance with the initial development of a product through production, test, installation, and servicing. The standards apply uniformly to any organization, in any industry, and of any size.

ISO 9001 registration is important because many organizations require their suppliers to be registered. In addition to the increase opportunities for registered orga-

nizations, compliance with ISO 9001 insures that the organization has a sound Quality Assurance system.

a. Background

On November 13, 1996, the Agency Administrator restated NASA's goal for technical excellence and directed NASA Headquarters Offices, Centers, and the Jet Propulsion Laboratory to become ISO 9001 registered. Ames Research Center was mandated to accomplish this goal no later than September 30, 1999.

b. Progress

At the end of 1998, Ames was in the final stages of implementing its Quality Assurance system. During the year, internal audits of the 7 directorates were completed in preparation for the preassessment audit in July, vertical internal audits of 87 organizations were completed in 7 weeks in preparation for the second preassessment audit in November, and audits for implementation effectiveness of Corrective Action Requests (CARs) were completed for all 7 directorates in December. A mature, second generation of documentation for the centerwide Quality Manual and 25 System Level Procedures (SLPs) and Work Instructions (WIs) were approved in late 1998.

Other accomplishments include the recommendation for ISO 9001 certification of the Independent Verification and Validation (IV&V) Facility in Fairmont, West Virginia and the successful completion of the first surveillance audit of the previously certified Wind Tunnel and Simulator Divisions.

c. Plans

In early 1999, Ames will complete the vertical audits of the directorates and perform horizontal internal audits of functional areas. Ames Research Center is on track to becoming ISO 9001 certified in April 1999, six months earlier than the established deadline.

■ Year 2000

At the direction of the Office of Management and Budget (OMB), all Federal Agencies, including NASA, are to perform the analysis and work necessary to be Year 2000 compliant by March 1999. To meet this goal, Ames created a Year 2000 Project Office to coordinate the Center's readiness effort. Formed early in 1998, the Project Office has been working aggressively with the Center's various Directorates to assess, repair, and test all important information technology systems. The Center effort has been aided greatly by each Directorate's decision to name a full-time coordinator to facilitate its Year 2000 activities. At the end of 1998, all important information systems used at the Center are on track to be certified as Year 2000 compliant by March 1999.

a. Progress

The effort's major accomplishment in 1998 was the execution of a Center-wide Year 2000 "re-assessment." Because of the Center's heavy dependence on information technology and its designation as the Center of Excellence for Information Technology (COE-IT), Management decided to support a Center-wide re-assessment to raise the level of assurance that the Center would experience no major Year-2000 related problems. The re-assessment effort focused on key facilities, essential Center services, and selected programs and projects. Although some problems were found and are being repaired, the majority of items looked at were found to be compliant. The main product of the re-assessment effort is the thorough set of Year 2000 compliance documentation compiled for the Center's important information technology systems.

b. Plans

In early 1999, the Center will complete all necessary Year-2000 related repairs and testing. The next step towards Year 2000 readiness will be the development of a business continuity plan for the Center and contingency plans for selected systems. In these plans, various Center organizations will develop contingencies for dealing with possible Year-2000 related failures, both internal and external. These plans will be developed by March 1999 and then updated as necessary through December. Ames Research Center has made a commitment to Year 2000 readiness and is well on its way to being prepared for the coming century change.

■ Ames Research Complex

The Ames Research Complex is 2000 acres of federally owned land under Ames' responsibility with tremendous potential for development within the technology-rich environment of Silicon Valley. In 1998 and continuing into 1999, Ames will use the land and buildings at Moffett to strengthen the Agency's leadership roles and support Ames' missions. This will be accomplished through greater partnerships in the fields of astrobiology, information technology, and aerospace technology. This effort will also augment the Center's ability to pursue the Agency's commercialization, education, and outreach goals. Leveraging resources in pursuit of NASA goals and programs will enhance Ames' reputation as a world class research and development facility, while increasing the efficiency of Ames' stewardship of Moffett.

B. Operations

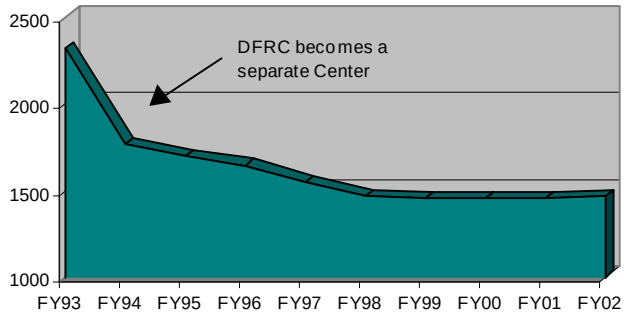
■ Workforce

NASA has made significant progress in its movement toward a smaller, but more focused, civil service workforce. In fact, more than three quarters of the 7,500 full-time equivalent (FTE) reductions needed in its civil service workforce have already been accomplished through voluntary measures such as separation incentives, hiring freezes, attrition, and aggressive outplacement.

NASA began its restructuring efforts in 1993 when it had approximately 25,000 civil servants at its Headquarters and Centers.

By the year 2000, NASA plans to have fewer than 18,000 civil servants. This workforce size was determined

ARC Full-Time Equivalent Trend (1993-2002)

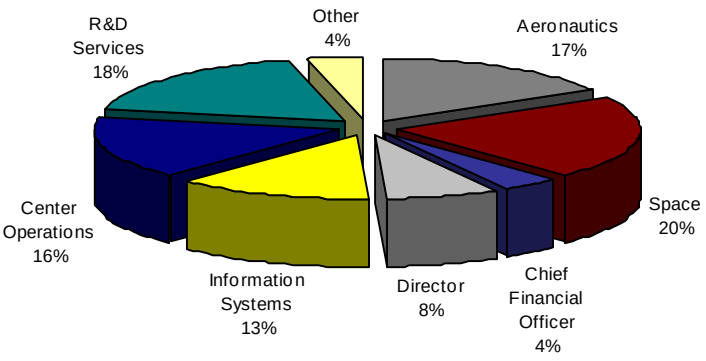


following a comprehensive Zero Base Review that redefined roles and missions and program management structures consistent with outyear funding levels. The staff reduction represents a 28 percent cut from 1993 levels and will result in the smallest civil service workforce since the 1960s.

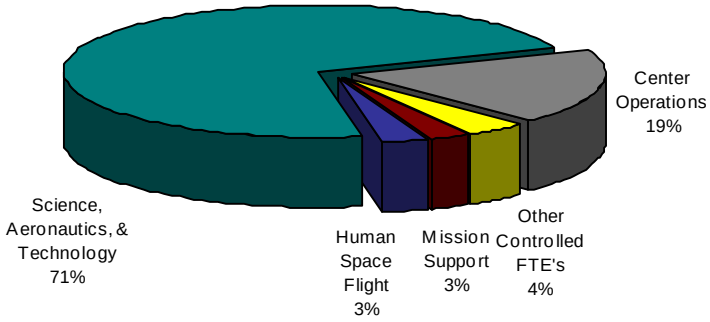
In 1998, Ames Research Center continued to work towards achieving its targeted FTE complement level. Some of the Center's initiatives include:

- Use of buyouts in 1994, 1995, 1997, and 1998 to achieve nearly 300 separations and to reach the target employment levels early;

ARC Workforce Distribution by Organization (1998)



ARC Workforce Programmatic Distribution (1998)



- Reorganization to improve the supervisory ratio from 1:5.8 to 1:10.6;
- Delegation of selected management authorities to nonsupervisory working managers, group leaders, and team leaders as the span of control increases for supervisors;
- Expanded use of teams to manage complex or cross-organizational projects;
- Streamlining of its reorganizational procedures, empowering division and directorate managers with more authority to make organizational changes;
- Shifting management's responsibility for complement control from headcount-based tracking to FTE tracking.

Through these initiatives, Ames is poised to accomplish the Agency's goal of reducing civil service employment in order to align human resources levels with external mandates, help optimize Agency investment strategies, and align human resources with customer requirements.

■ Purchase Card Program

The U.S. Government purchase card program, started in 1989, achieves Government-wide savings by reducing, by as much as 14 percent, the administrative costs associated with official small purchases of commercially available goods and services.

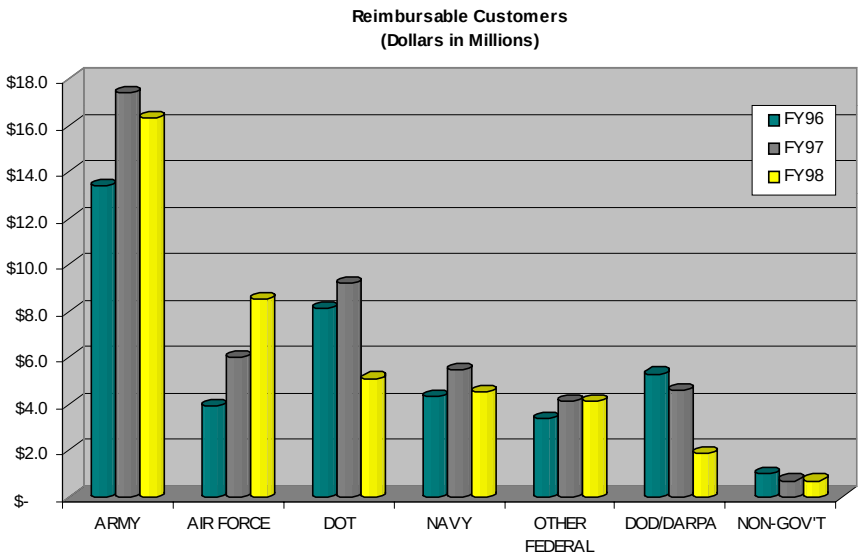
Use of the purchase card expedites the acquisition of essential supplies and services, streamlines payment procedures, and reduces the administrative costs associated with traditional paper based payment methods.

Ames began participating in the purchase card program in 1990. The Center had less than 20 cardholders at that time. Since then, it has enjoyed widespread acceptance because of its efficiency and ease-of-use. In 1998, there were more than 340 cardholders with an annual purchase total of $9.7 million. The average purchase amount was $550. Ames will continue to use the purchase card to increase financial and procurement efficiency and reduce administrative costs.

■ Reimbursable

Reimbursable agreements are binding agreements with customers for NASA to sell or rent materials, equipment, or services. In 1998, Ames had reimbursable agreements totaling $41 million. Reimbursable agreements totaled $48 million for 1997 and $39 million for 1996. Ames' largest reimbursable customer continues to be the Army, representing 40 percent of the reimbursable dollars received in 1998. The Air Force represented Ames' second largest reimbursable customer with 21 percent, followed by the Department of Transportation with 12 percent.

Approximately 76 percent of all reimbursable dollars received are for Science, Aeronautics and Technology (SAT), 21 percent for Research Operation Support (ROS), 2 percent for travel, and less than 1 percent for salaries.

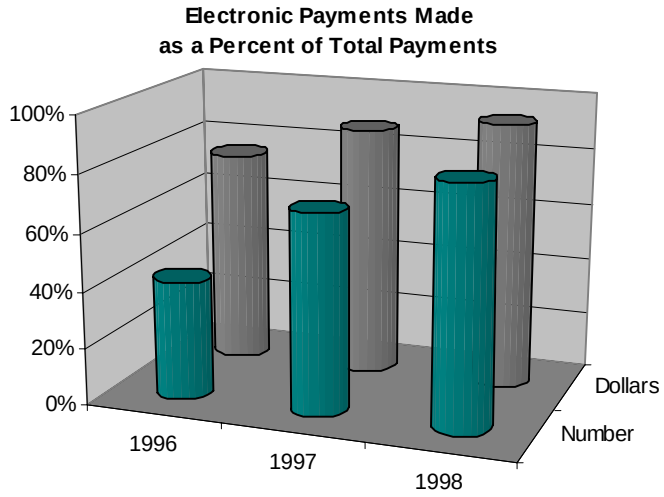


■ Prompt Payment Act

The Prompt Payment Act requires federal agencies to pay their bills on a timely basis. Interest penalties are imposed on any payment not made in accordance with the Act. In 1998, Ames' interest penalties totaled $10,600 on total payments of $452 million. Interest penalties represented 0.0023 percent of the total payments made. Interest penalties for 1997 and 1996 were $10,300 and $20,800, respectively, representing 0.0019 percent and 0.0043 percent of the total payments made for their respective years.

Ames is working towards processing and paying the majority of its bills electronically in order to minimize costs and increase efficiency. Approximately 84 percent of all bills were paid electronically in 1998 compared to 70 percent in 1997 and 41 percent in 1996. In dollar terms, 93 percent of all dollars were paid electronically in 1998, compared to 88 percent in 1997 and 75 percent in 1996.

Some vendors offer early payment discounts. These discounts, when determined to be cost effective, are taken and reduce the amount paid out by Ames. In 1998, 99.3 percent of all discounts offered and determined to be cost effective were taken. The percentage of discounts taken in 1997 and 1996 were 99.5 percent and 98.4 percent, respectively.

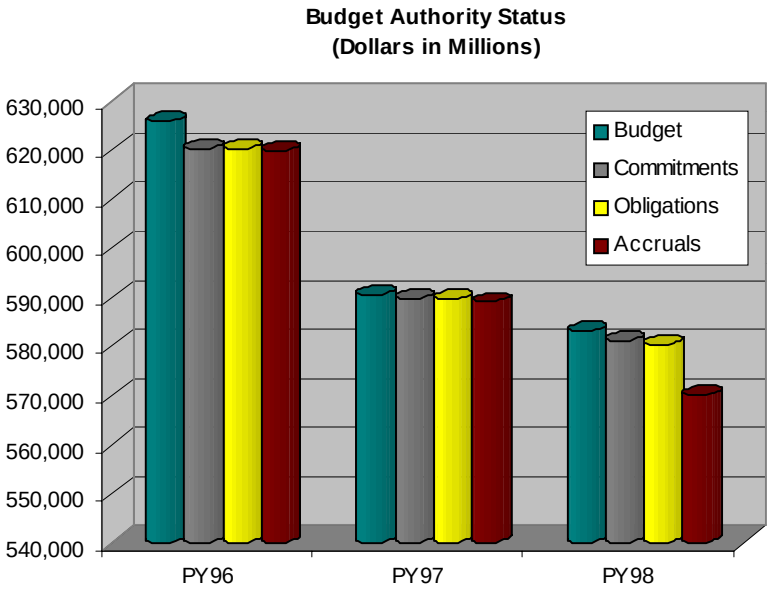


Budget Information

Ames' budget authority for fiscal year 1998 was $582.7 million. This reflects a one percent decrease from the Center's 1997 budget authority. The table below presents comparisons of budget authority, commitments, obligations, and accruals for fiscal years 1996 through 1998. Ames has aggressively implemented financial metrics for all of its programs. The Center is attempting to achieve 100 percent commitments and obligations and 83 percent accruals on its current year funding. Ames has made significant progress in achieving these goals. In accomplishing the financial metrics, Ames substantiates its budgetary requirements through timely utilization of its financial resources.

Ames is succeeding in implementing a variety of new initiatives at the Center. This is evidenced by a 5% growth in the Ames budget from fiscal year 1998 to fiscal year 1999. The 1999 budget is estimated at $613.5 million with a similar upward trend through the budget horizon.

In this era of limited personnel resources, Ames is striving to improve its business processes to ensure the accomplishment of its mission in the most efficient manner. Significant emphasis is placed on workforce reporting as this will be the foundation for accurate full cost budgeting and accounting.



(In Millions)

Program Office	BUDGET			COMMITMENTS			OBLIGATIONS			ACCRUALS		
	PY98	PY97	PY96	PY98	PY97	PY96	PY98	PY97	PY96	PY98	PY97	PY96
OASTT	257,347	219,088	258,729	256,945	219,084	258,729	256,551	219,078	258,729	252,366	219,037	258,729
OES	8,560	22,195	35,582	8,560	22,106	35,582	8,375	22,016	35,582	7,988	21,998	35,582
OSS	81,944	74,012	98,996	81,294	73,985	94,052	81,175	73,984	94,052	78,248	73,858	93,883
OLMSA	24,594	46,016	55,330	24,587	46,012	55,330	24,578	46,012	55,330	24,372	45,996	55,330
OPOs	37,963	16,797	9,511	37,351	16,781	9,316	37,320	16,781	9,316	36,073	16,781	9,316
ROS	28,204	27,970	24,232	28,204	27,970	24,232	28,204	27,970	24,232	28,038	27,970	24,232
R&PM	138,742	138,899	131,898	138,689	138,889	131,638	138,689	138,889	131,638	138,266	138,870	131,632
ADTE	N/A	35,000	N/A	N/A	35,000	N/A	N/A	35,000	N/A	N/A	35,000	N/A
CofF (MS)	5,670	10,609	11,546	5,616.0	9,905	11,491	5,514.0	9,792	11,476	4,724.0	9,574	11,198
TOTAL	583,024	590,586	625,824	581,246	589,732	620,370	580,406	589,522	620,355	570,075	589,084	619,902
% OF BUDGE	100%	100%	100%	100%	100%	99%	100%	100%	99%	98%	100%	99%

Program Office	BUDGET			COMMITMENTS			OBLIGATIONS			ACCRUALS		
	PY98	PY97	PY96	PY98	PY97	PY96	PY98	PY97	PY96	PY98	PY97	PY96
OASTT	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%
OES	100%	100%	100%	100%	100%	100%	98%	99%	100%	93%	99%	100%
OSS	100%	100%	100%	99%	100%	95%	99%	100%	95%	95%	100%	95%
OLMSA	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	100%	100%
OPOs	100%	100%	100%	98%	100%	98%	98%	100%	98%	95%	100%	98%
ROS	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	100%	100%
R&PM	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
ADTE	N/A	100%	N/A	N/A	100%	N/A	N/A	100%	N/A	N/A	100%	N/A
CofF (MS)	100%	100%	100%	99%	93%	100%	97%	92%	99%	83%	90%	97%

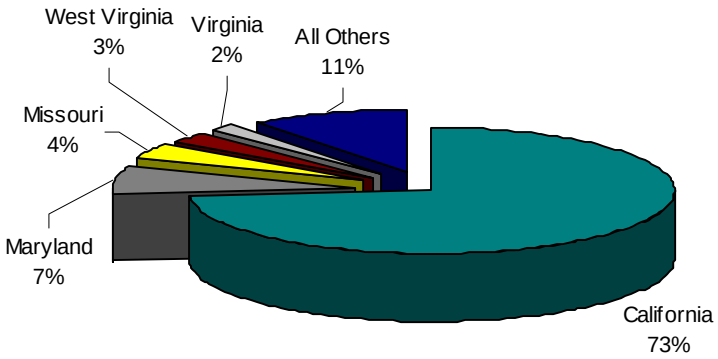
Economic Impact

Ames Research Center significantly impacts the local and national economy. In accomplishing its mission, Ames spends a significant portion of its resource on contracts to acquire goods and services. As of September 30, 1998, Ames awarded approximately $448 million for prime contracts. Of that figure, approximately $330 million or 73 percent remained in California.

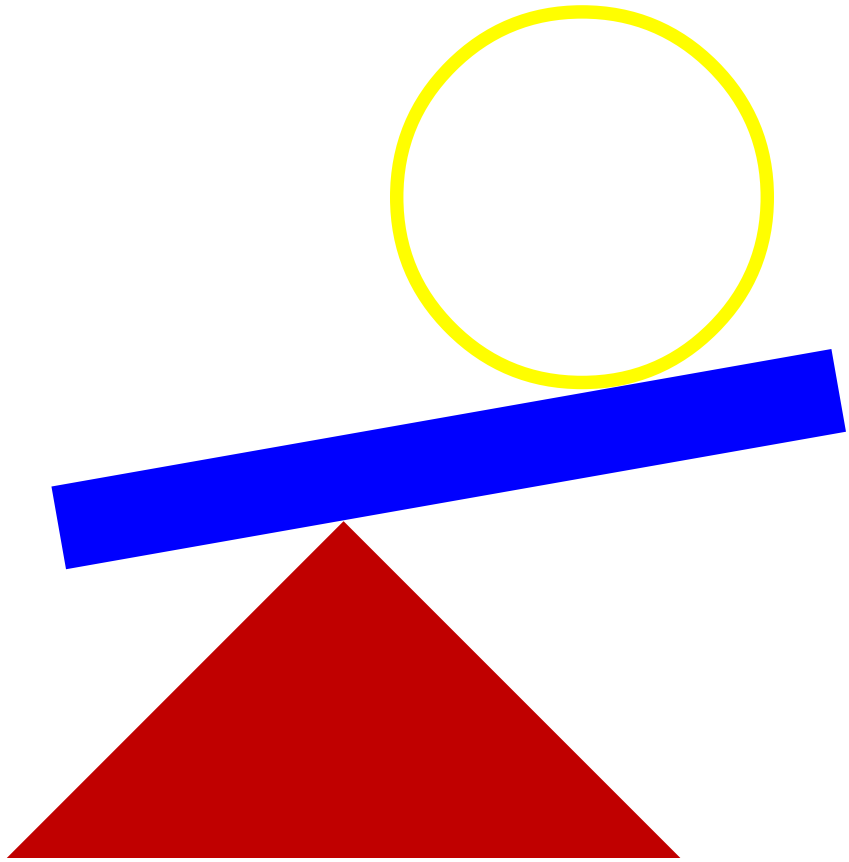
U.S. Geographical Distribution of Prime Contract Awards
As of September 30, 1998
(In Thousands)

State	Dollars Awarded	Percent of Total
Alabama	$ 480	0.11%
Alaska	2,500	0.56%
Arizona	2,040	0.46%
Arkansas	44	0.01%
California	330,306	73.74%
Colorado	1,780	0.40%
Connecticut	1,234	0.28%
District of Columbia	642	0.14%
Florida	1,649	0.37%
Georgia	1,295	0.29%
Hawaii	312	0.07%
Idaho	47	0.01%
Illinois	524	0.12%
Indiana	467	0.10%
Iowa	404	0.09%
Kansas	372	0.08%
Kentucky	71	0.02%
Louisiana	387	0.09%
Maryland	31,510	7.03%
Massachusetts	6,395	1.43%
Michigan	205	0.05%
Minnesota	2,629	0.59%
Mississippi	517	0.12%
Missouri	17,346	3.87%
Montana	55	0.01%
New Hampshire	394	0.09%
New Jersey	667	0.15%
New Mexico	1,843	0.41%
New York	1,576	0.35%
North Carolina	452	0.10%
Ohio	1,020	0.23%
Oklahoma	37	0.01%
Oregon	810	0.18%
Pennsylvania	3,606	0.80%
Rhode Island	257	0.06%
South Carolina	174	0.04%
Tennessee	4,193	0.94%
Texas	1,689	0.38%
Utah	1,106	0.25%
Virginia	7,861	1.75%
Washington	2,092	0.47%
West Virginia	13,635	3.04%
Wisconsin	3,284	0.73%
Wyoming	68	0.02%
Total	**$ 447,955**	**100.00%**

Top 5 States by Prime Contract Awards
As of September 30, 1998



FINANCIAL STATEMENTS



STATEMENT OF FINANCIAL POSITION (UNAUDITED)

Ames Research Center
Statement of Financial Position
For the Fiscal Year Ended September 30, 1998
(In Thousands)

	September 30, 1998	September 30, 1997
Assets:		
Intragovernmental Assets:		
Fund Balance with U.S. Treasury (Note 2)	$ 225,862	$ 254,368
Accounts Receivable, Net (Note 3)	8,546	11,953
Governmental Assets:		
Accounts Receivable, Net (Note 3)	115	106
Operating Materials & Supplies (Note 4)	950	1,014
Property, Plant and Equipment (Note 5)	928,555	1,358,327
Other Assets (Note 6)	1,546	116
Total Assets	$ 1,165,574	$ 1,625,884
Liabilities:		
Liabilities Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Accounts Payable	$ 19,881	$ 17,758
Other Liabilities (Note 7)	919	2,340
Governmental Liabilities:		
Accounts Payable	106,724	112,099
Other Liabilities (Note 7)	6,088	5,111
Total	133,612	137,308
Liabilities not Covered by Budgetary Resources:		
Governmental Liabilities:		
Other Liabilities (Note 7)	29,427	29,385
Total	29,427	29,385
Total Liabilities	163,039	166,693
Net Position:		
Balances:		
Unexpended Appropriations	100,899	129,054
Invested Capital	931,051	1,359,458
Cumulative Results of Operations	12	64
Future Funding Requirements	(29,427)	(29,385)
Total Net Position (Note 8)	1,002,535	1,459,191
Total Liabilities and Net Position	$ 1,165,574	$ 1,625,884

The accompanying notes are an integral part of these statements.

STATEMENT OF OPERATIONS & CHANGES IN NET POSITION (UNAUDITED)

Ames Research Center
Statement of Operations & Changes in Net Position
For the Fiscal Year Ended September 30, 1998
(In Thousands)

	September 30, 1998	September 30, 1997
Revenue and Financing Sources:		
Appropriated Capital Used	$ 580,740	$ 589,539
Revenue from Sales of Goods and Services:		
To the public	596	617
Intragovernmental	44,560	44,808
Total Revenue and Financing Sources	625,896	634,964
Expenses:		
Program or Operating Expenses		
Science, Aeronautics and Technology	387,297	372,060
Human Space Flight	15,461	2,598
Mission Support	174,523	173,898
National Aeronautics Facilities	3,456	31,544
Research and Development	(40)	6,437
Space Flight Control & Data Communications	(19)	(49)
Research and Program Management	(13)	(166)
Construction of Facilities	127	815
Reimbursable Expenses	45,156	45,425
Total Expenses	625,948	632,562
Excess (Shortage) of Revenue and Financing Sources Over Total Expenses	(52)	2,402
Non-Operating Changes:		
Unexpended Appropriations	(28,155)	(98,010)
Invested Capital	(428,407)	73,632
Future Funding Requirements	(42)	(15,089)
Total Non-Operating Changes	(456,604)	(39,467)
Excess (Shortage) of Revenue & Financing Sources Over Total Expenses and Nonoperating Changes	(456,656)	(37,065)
Net Position, Beginning Balance	1,459,191	1,496,256
Net Position, Ending Balance	$ 1,002,535	$ 1,459,191

The accompanying notes are an integral part of these statements.

STATEMENT OF NET COST (UNAUDITED)

Ames Research Center
Statement of Net Cost
For the Fiscal Year Ended September 30, 1998
(In Thousands)

Program/Operating Expenses By Enterprise:		
Human Exploration and Development of Science:		
Space Shuttle	$	4,732
Space Station		20,748
Life & Microgravity		28,187
U.S./Russian Cooperative		2,557
Payload Utilization & Operations		18,308
Total Human Exploration and Development of Space		74,532
Space Science:		
Space Science		91,430
Planetary Exploration		9,354
Total Space Science		100,784
Earth Science:		
Mission to Planet Earth		25,958
Total Earth Science		25,958
Aeronautics and Space Technology:		
Aeronautics Research and Technology		315,041
Space Access and Technology		20,367
Commercial Programs		19,018
Total Aeronautics and Space Technology		354,426
Total Enterprise Program Costs		**555,700**
Costs Not Assigned to Enterprises:		
Mission Communication Services		0
Space Communication Services		0
Academic Programs		0
Other Programs		25,092
Trust Funds		0
Reimbursable Expenses		45,156
Total Costs Not Assigned to Enterprises		**70,248**
Total Program Expenses		**625,948**
Costs Not Assigned to Programs:		
Change in Unfunded Expenses		0
Depreciation Expense		0
Funded Increases in Capitalized Property and Inventory, Net		0
Total Costs Not Assigned to Programs		0
Less: Earned Revenues Not Attributable to Programs		0
Deferred Maintenance		0
Net Cost of Operations	**$**	**625,948**

The accompanying notes are an integral part of these statements.

NOTES TO THE FINANCIAL STATEMENTS

Note 1. Summary of Significant Accounting Policies

■ Basis of Presentation

These financial statements have been prepared for FY 1998 to report the financial position and results of operations for Ames Research Center, pursuant to the requirements of the Chief Financial Officers Act of 1990 and the Government Management Reform Act of 1994. These include the Statement of Financial Position, Statement of Operations and Changes in Net Position, and Statement of Net Cost. While the statements have been prepared from the books and records of Ames, in accordance with formats prescribed by the Office of Management and Budget (OMB) Bulletin 94-01, the statements are different from the financial reports used to monitor and control budgetary resources which are prepared from the same books and records. The statements should be read with the realization that they are for a component of a sovereign entity, that liabilities not covered by budgetary resources cannot be liquidated without the enactment of an appropriation, and that the payment of all liabilities other than for contracts can be abrogated by the sovereign entity.

■ Reporting Entity

Ames is one of nine NASA field centers established to aid NASA in its mission to provide for aeronautical and space activities. The Ames Research Center's accounting system, Commitment, Obligation, Accrual, Disbursement (COAD) is a mechanized system which utilizes the single source data entry concept to reduce redundancy of data entry. Multiple transactions are entered into the system simultaneously utilizing a coding structure that allows the system to generate files to be downloaded to the appropriate general ledger accounts. The system provides payroll accounting for approximately 1,500 civilian employees and processes approximately 40,000 non-payroll related accounting transactions monthly. These are used to update the Financial and Contractual Status (FACS) report and the General Ledger. This data provides the basic information necessary to meet internal and external financial reporting requirements and provides both funds control and accountability. Ames utilizes fund accounting for control purposes in accordance with Generally Accepted Accounting Principles and Standards established by the General Accounting Office (GAO) and the Office of Management and Budget (OMB). A fund is a fiscal and accounting entity with a self-balancing set of accounts, recording financial resources together with all related liabilities and fund balances for the purpose of attaining established objectives. Funds are made available for withdrawal from the U.S. Treasury through Congressional appropriation acts.

■ Basis of Accounting

Transactions are recorded on an accrual accounting basis and a budgetary basis. Under the accrual method, revenues are recognized when earned and expenses are recognized when a liability is incurred, without regard to receipt or payment of cash. Budgetary accounting facilitates compliance with legal constraints and controls over the use of federal funds.

■ Revenues and Other Financing Sources

Ames receives the majority of its funding through multi-year appropriations. For Program Year (PY) 1994 and prior, these include 3-year and no-year appropriations for Construction of Facilities (C of F), 2-year appropriations for Research and Development (R & D) and Space Flight Control and Data Communications (SFCDC), and a single year appropriation for Research and Program Management (R & PM). Due to the appropriation restructure, three new appropriations were established in PY 1995. These three new appropriations are Science, Aeronautics & Technology (SAT); Human Space Flight (HSF); and Mission Support (MS). In addition to appropriated funds, the Center performs services for other Federal agencies and the public and receives reimbursable funding. Appropriations are recognized as revenue at the time the related program or administrative expenses are incurred. Other revenue are recognized when earned (i.e. goods have been delivered or services rendered).

■ Funds with the U.S. Treasury and Cash

Ames does not have disbursing authority and does not maintain cash in commercial bank accounts. Cash receipts and disbursements are processed by the U.S. Treasury. Funds with the U.S. Treasury include appropriated funds and deposit funds received from the public as advance payments for reimbursable services.

■ Advances

Advances include travel advances, cash grants, and letter of credit. Ames funds most of its University Contracts and Grants programs through the use of a letter of credit system and the automated clearing house. Quarterly financial reporting of cash transactions is provided by recipients showing both cash requirements and cash transactions on Standard Form (SF) 272's. Detailed monitoring and accountability records are maintained. Monitoring includes audits by the Defense Contract Audit Agency (DCAA) and NASA's Office of Inspector General (OIG).

■ Accounts Receivable

Ames provides accounting for substantial amounts of receivables for services provided to the public and other Government agencies. The largest portion of these is performed for other Federal agencies and includes aeronautical research and technology as well as research operation support. Non-Government customers are required to provide advance payments which are placed on

deposit with the U.S. Treasury until services are performed.

■ Operating Materials and Supplies

Ames' inventory of Operating Materials and Supplies is composed of the following categories: (a) Stores stock which is material that is repetitively procured, stored, and issued on the basis of recurring demand, and (b) Standby stock which is material held for emergencies. Operating Materials and Supplies are stated at cost and charged, as used, on a moving average basis.

■ Equipment

Equipment with a unit cost of $100,000 or more, and a useful life of two years or more, that will not be consumed in an experiment is capitalized. Equipment with a unit cost of less than $100,000, or having a useful life of less than two years, that will be consumed in an experiment is expensed as current year cost. Beginning with FY 1998, NASA implemented Statement of Federal Financial Accounting Standards (SFFAS) Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These standards raised the equipment capitalization threshold from $5,000 to $100,000. The capitalized cost includes unit cost, transportation charges, installation charges, handling costs, and storage costs. NASA depreciates property, plant, and equipment on a straight-line basis. The use of NASA facilities and equipment is included in charges to Non-Government reimbursable customers.

■ Contractor-Held Property

Government-owned, contractor-held property includes real property such as land, building and structures, inventories, plant equipment, space hardware, special tooling, and special test equipment. Contractors, in accordance with Federal Acquisition Regulations, are required to maintain control and accountability of such property. Ames is precluded from maintaining duplicate records of these assets. Contractors are required to report, on an annual basis, plant equipment costing $100,000 or more, having a useful life of two years or more, and which will not be consumed in an experiment. Beginning with FY 1998, NASA implemented Statement of Federal Financial Accounting Standards (SFFAS) Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These Standards raised the equipment capitalization threshold from $5,000 to $100,000. NASA depreciates Contractor-Held Equipment on a straight-line basis. Contractors are also required to submit depreciation and inactive asset data in supplemental forms that accompany the NASA Form 1018, Report of Government-Owned, Contractor-Held Property. Reporting of Special Test Equipment, Special Tooling, and designated Space Hardware is also required. The NASA Form 1018 is certified by the contractor's representative and approved by a Government property administrator.

■ Real Property

Real Property includes land, buildings, other structures and facilities, and leasehold improvements when the cost of acquiring and improving the asset is $100,000 or more. Land is valued at acquisition cost which may not reflect actual value. Buildings are also valued at cost, including the cost of capital improvements and fixed equipment required for functional use of the facility. Beginning with FY 1998, NASA implemented Statement of Federal Financial Accounting Standards (SFFAS) Number Six – Accounting for Property, Plant, and Equipment, and SFFAS Number Eight – Supplementary Stewardship Reporting. These standards raised the Real Property capitalization threshold from $5,000 to $100,000. The adoption of these standards required NASA to classify its Real Property into the following categories: General PP&E, Federal Mission PP&E, Heritage Assets, and Inactive PP&E. Real Property classified as Federal Mission PP&E, Heritage Assets and/or Inactive PP&E have been removed from the financial statements. These assets are reported in physical units. Depreciation for Real Property is monitored and reported by NASA Headquarters. Real property controlled by contractors are reported on NASA Form 1018 and included in Ames' real property account.

■ Liabilities

Accounts payable include amounts recorded for receipt of goods or services furnished to the
Agency, based on receiving reports, billings rendered, and cost reports (i.e. NASA Form 533, Contractor Financial Management Report; Standard Form 272, Federal Cash Transactions Report) that provide the estimated contractor and grantee unbilled and unreported cost, and estimated amounts for utilities and payroll.

■ Annual, Sick, and Other Leave

Annual leave is accrued at the beginning of each calendar year and the accrual is reduced as leave is taken. At least once per year, the balance in the accrued annual leave account is adjusted to reflect current pay rates of cumulative annual leave earned but not taken. Sick and other types of leave are expensed as taken.

(In Thousands)

Note 2. Fund Balance with Treasury

Fund Balances:	Obligated	Unobligated Available	Unobligated Restricted	Fund Balance
Appropriated Funds	$ 197,907	23,485	3,685	$ 225,077
Suspense/Clearing Accounts				785
Total Fund Balance with Treasury				$ 225,862

Note 3. Accounts Receivable

	Entity Accounts Receivable	Non-Entity Accounts Receivable	Allowance for Uncollectible Receivables	Net Amount Due
Intragovernmental	$ 8,546	$ 0	$ 0	$ 8,546
Governmental	61	68	(14)	115
Total Accounts Receivable	$ 8,607	$ 68	$ (14)	$ 8,661

Note 4. Operating Materials and Supplies, Net

	1998	1997	Valuation Method
Stores Stock	$ 950	$ 1,014	Weighted Average
Total	$ 950	$ 1,014	

Note 5. Property, Plant, and Equipment

	1998	1997
Government-owned/Government-held:		
Land	$ 3,936	$ 6,865
Structures, Facilities & Leasehold Improvements	636,320	779,538
Equipment	263,579	345,557
Assets Under Capital Lease	0	48,443
Construction in Progress	0	123,706
Total	$ 903,835	$ 1,304,109
Government-owned/Contractor-held:		
Equipment	$ 337	$ 3,342
Special Tooling	0	467
Special Test Equipment	0	1,255
Space Hardware	13,518	39,123
Construction in Progress	10,865	10,031
Total	$ 24,720	$ 54,218
Total Property, Plant and Equipment	$ 928,555	$ 1,358,327

(In Thousands)

Note 6. Other Assets

	1998	1997
Contractor-held Materials	$ 1,546	$ 116
Total	$ 1,546	$ 116

Note 7. Other Liabilities

Liabilities Covered by Budgetary Resources:

	Current	Non-Current	Total
Intragovernmental Liabilities:			
*Liability for Deposit and Suspense Funds	$ 919	$ 0	$ 919
Total	$ 919	$ 0	$ 919
Governmental Liabilities:			
Accrued Funded Payroll and Benefits	$ 6,088	$ 0	$ 6,088
*Liability for Deposit and Suspense Funds	0	0	0
Total	$ 6,088	$ 0	$ 6,088
Liabilities Not Covered by Budgetary Resources:			
Governmental Liabilities:			
Accounts Payable for Closed Appropriations	$ 0	$ 1,876	$ 1,876
Unfunded Annual Leave	0	9,512	9,512
Contingent Liabilities	0	18,039	18,039
Total	$ 0	$ 29,427	$ 29,427

*Liabilities include cash advances received from other Government agencies and public reimbursable customers. Also included are funds on deposit with the U.S. Treasury for employees' savings bonds and state tax withholdings.

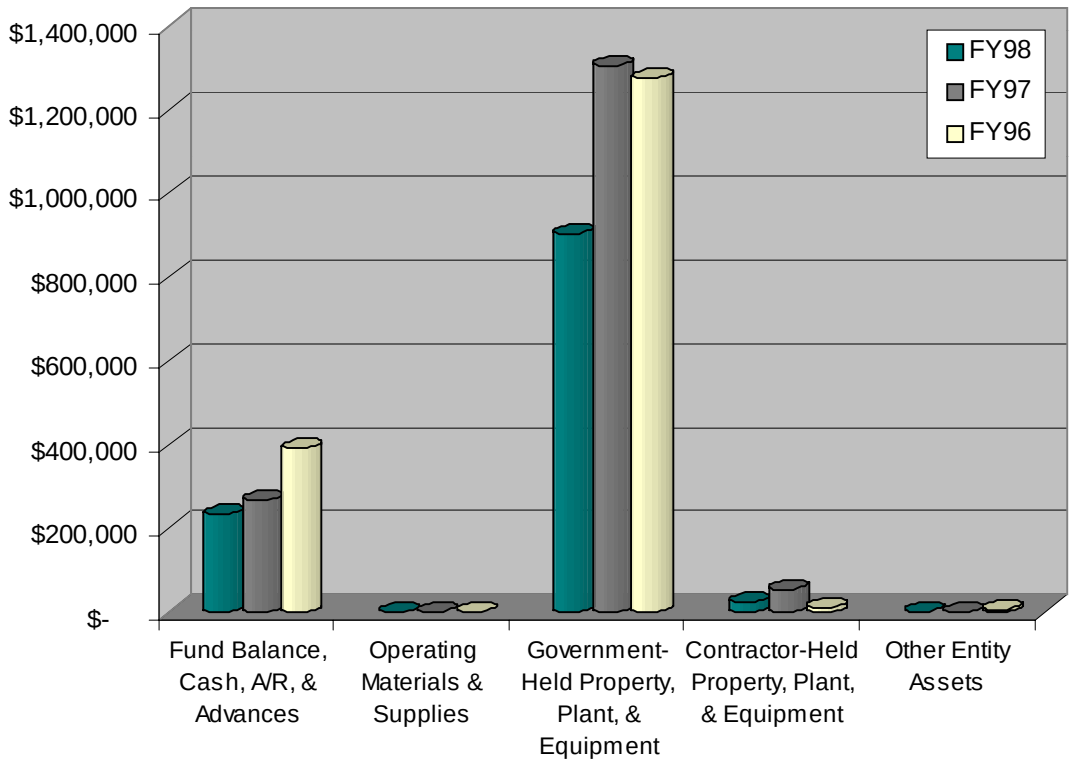
Note 8. Net Position

	Appropriated Funds
Unexpended Appropriations	
Undelivered	$ 73,729
Unobligated:	
Available	23,485
Restricted	3,685
Invested Capital	931,051
Cumulative Results	12
Future Funding Requirements	(29,427)
Total	$ 1,002,535

ASSETS

Ames' assets have decreased from $1.62 billion in 1997 to $1.16 billion in 1998. The decrease is primarily due to the implementation of SFFAS Numbers 6 and 8. Of the $460 million decrease, $430 million is related to adjustments to Government and Contractor-Held Property, Plant, and Equipment. See Note 1 for more information.

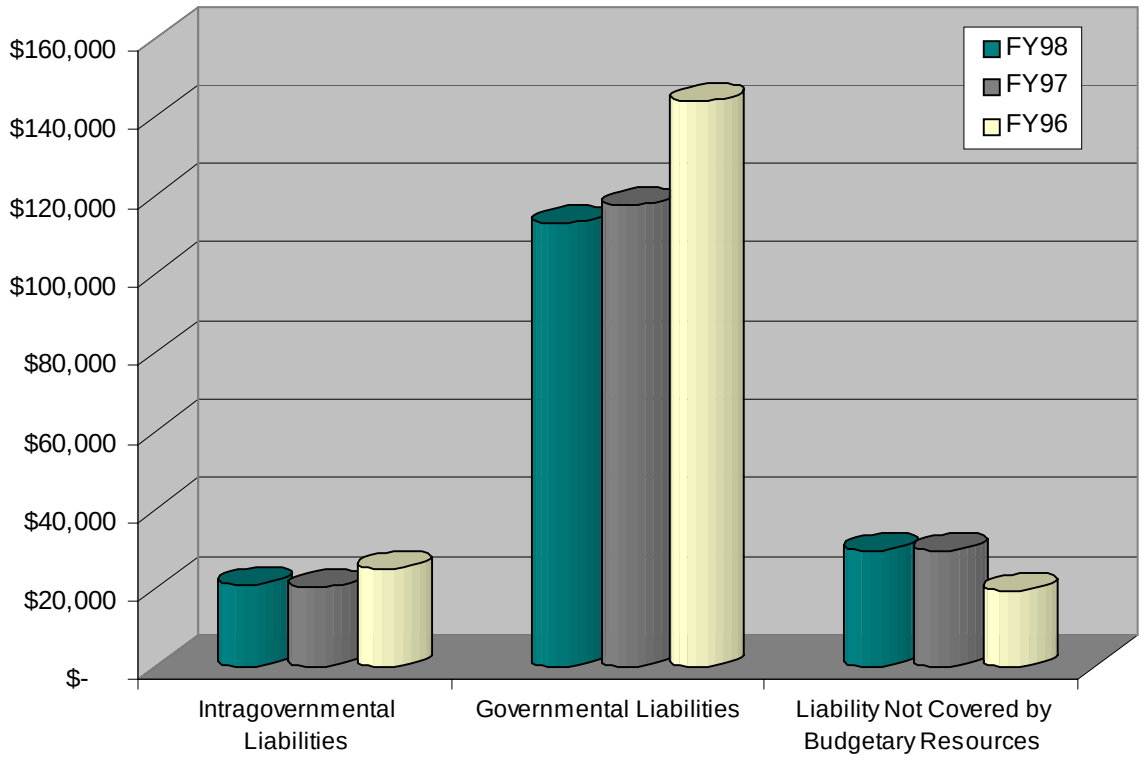
(In Thousands)	1998	1997	1996
Fund Balance, Cash, A/R, & Advances	$ 234,408	$ 266,427	$ 390,632
Operating Materials & Supplies	950	1,014	1,312
Government-Held Property, Plant, & Equipment	903,835	1,304,109	1,274,221
Contractor-Held Property, Plant, & Equipment	24,720	54,218	10,967
Other Entity Assets	1,546	116	7,029
Total Assets	**$ 1,165,459**	**$ 1,625,884**	**$ 1,684,161**



LIABILITIES

Ames' liabilities slightly decreased from $167 million in 1997 to $163 million in 1998.

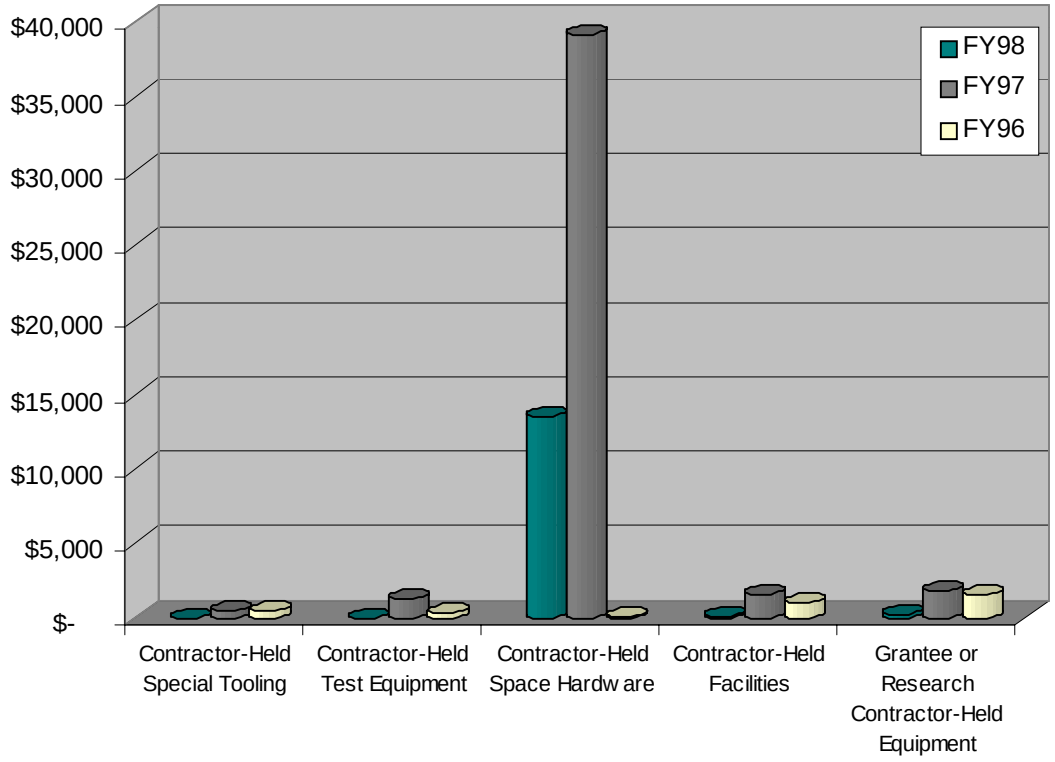
(In Thousands)	1998	1997	1996
Intragovernmental Liabilities	$ 20,800	$ 20,098	$ 24,817
Governmental Liabilities	112,812	117,210	143,662
Liability Not Covered by Budgetary Resources	29,427	29,385	19,426
Total Liabilities	**$ 163,039**	**$ 166,693**	**$ 187,905**
As a Percent of Total Assets	**14.0%**	**10.3%**	**11.2%**



CONTRACTOR-HELD PROPERTY

Contractor-Held property represents less than one percent of Ames' total assets. Contractor-Held property was $14.2 million, $44.2 million, and $3.3 million for fiscal years 1998, 1997, and 1996, respectively. Of the $30 million decrease in Contractor-Held property from 1997 to 1998, $26.7 million was related to the Lunar Prospector Mission and $3.3 million was due to the implementation of SFFAS Numbers 6 and 8.

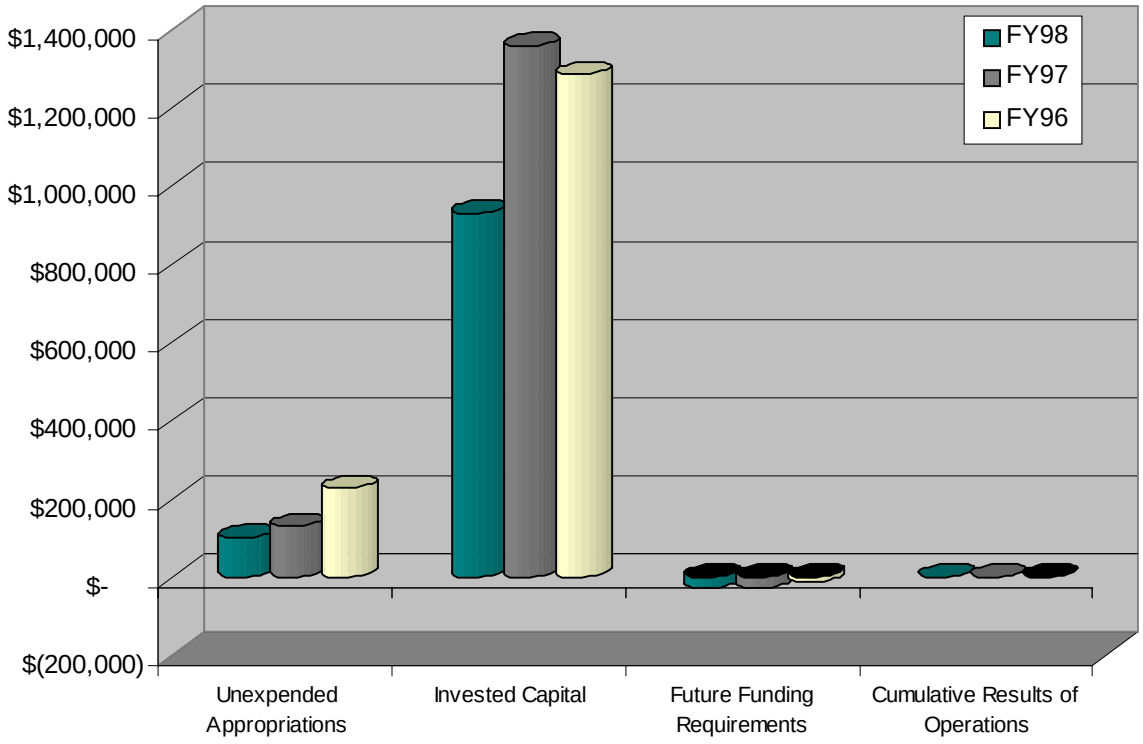
(In Thousands)	FY98	FY97	FY96
Contractor-Held Special Tooling	$ 0	$ 467	$ 451
Contractor-Held Test Equipment	0	1,255	327
Contractor-Held Space Hardware	13,518	39,123	45
Contractor-Held Facilities	105	1,568	989
Grantee or Research Contractor-Held Equipment	232	1,774	1,532
Total Contractor-Held Property	**$ 13,855**	**$ 44,187**	**$ 3,344**
As a Percent of Total Assets	**1.2%**	**2.7%**	**0.2%**



NET POSITION

Ames' net position decreased from $1.46 billion in 1997 to $1.00 billion in 1998. Invested Capital accounted for $428 million of the decrease in Net Position from 1997 to 1998, primarily due to the implementation of SFFAS Numbers 6 and 8.

(In Thousands)	FY98	FY97	FY96
Unexpended Appropriations	$ 100,899	$ 129,054	$ 227,064
Invested Capital	931,051	1,359,458	1,285,826
Future Funding Requirements	(29,427)	(29,385)	(14,296)
Cumulative Results of Operations	12	64	(2,338)
Total Net Position	**$ 1,002,535**	**$ 1,459,191**	**$ 1,496,256**
As a Percent of Total Assets	**86.0%**	**89.7%**	**88.8%**



Unexpended Appropriations includes the following:

(In Thousands)	1998	1997	1996
Unobligated	$ 27,170	$ 35,595	$ 80,802
Undelivered Orders	73,729	93,459	146,262
Total Unexpended Appropriations	**$ 100,899**	**$ 129,054**	**$ 227,064**

Invested Capital includes the following:

(In Thousands)	1998	1997	1996
Operating Materials and Supplies (Government-Held)	$ 950	$ 1,014	$ 1,312
Operating Materials and Supplies (Contractor-Held)	1,546	116	160
Personal Property (Held for Disposal)	0	0	6,869
Fixed Assets (Government-Held)	903,835	1,131,960	1,135,785
Fixed Assets in Progress (Government-Held)	0	123,707	85,675
Fixed Assets (Contractor-Held)	13,855	44,186	3,344
Fixed Assets in Progress (Contractor-Held)	10,865	10,032	7,623
Capitalized Leases	0	48,443	52,761
Total	931,051	1,359,458	1,293,529
Less: Liabilities for Capitalized Leases	0	0	7,703
Total Invested Capital	**$ 931,051**	**$ 1,359,458**	**$ 1,285,826**

Future Funding Requirements includes the following:

(In Thousands)	1998	1997	1996
Accounts Payable / Canceled Appropriations	$ 1,876	$ 1,839	$ 1,658
Liability for Accrued Annual Leave	9,442	9,971	12,638
Accrued Unfunded Liability	18,109	17,575	0
Total Future Funding Requirements	**$ 29,427**	**$ 29,385**	**$ 14,296**

Key Personnel

Henry McDonald
Director

William E. Berry
Deputy Director

Robert J. Hansen
Deputy Director for Research

Robert Rosen
Associate Director for Aerospace Programs
Director of Aeronautics (Acting)

Kenneth M. Ford
Associate Director for Information Technology

Nancy F. Bingham
Assistant Director for Planning
Director of Research and Development Services (Acting)

Lewis S.G. Braxton III
Chief Financial Officer

Janis D. Monk
Chief (Acting), Equal Opportunity Programs Office

Carolina M. Blake
Chief (Acting), Commercial Technology Office

Thomas W. Berndt
Chief Counsel (Acting), Office of the Chief Council

Warren F. Ahyte
Chief Engineer, Office of the Chief Engineer

Michael L. Marlaire
Chief, External Affairs Office

Steve R. Zornetzer
Director of Information Systems

Jana M. Coleman
Director of Center Operations

David Morrison
Director of Space

G. Warren Hall
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